WAGENBORG SHIPPING

HAI VUONG
The 5th-Year Navigating Cadet

THE JUNIOR OFFICER'S HANDBOOK

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Academic Institution

MV Arubaborg
2019

Admiral Nevelskoy Maritime State University

SHIPBOARD TRAINING ASSIGNMENT

Ship's name	**MV ARUBABORG**
Shipping company	**Wagenborg Shipping B.V.**
Flag	**Dutch**
Main dimensions	**LOA 143.0 m x BOA 21.5 m**
Voyages	**Sheerness – Dunkirk – Antwerp – Bremen – Wilmington, NC – Veracruz – Altamira – New Orleans – Port Everglades – St. John's (Antigua)**
Training officer	**Second Officer Tanase Adrian Alexandru**
Sign on – Sign off	**03.03.2019 – 09.05.2019**

Author: Navigating Cadet – Group 0151

HAI VUONG

Inspected: Teachers / Professors

Navigating Faculty, "Navigation"	
Navigating Faculty, "Nautical Astronomy"	
Ship Handling Faculty	
Navigational Technical Equipment Faculty	

MV Arubaborg

2019

Федеральное агентство морского и речного транспорта
Федеральное государственное бюджетное образовательное учреждение
высшего профессионального образования

«Морской государственный университет им. адм. Г.И. Невельского»

ОТЧЁТ

ПЛАВАТЕЛЬНОЙ ПРАКТИКИ

Название судна	**MV ARUBABORG**
Судоходная компания	**Wagenborg Shipping B.V.**
Флаг	**Dutch**
Главные размерения	**LOA 143.0 m x BOA 21.5 m**
Переходы	**Sheerness – Dunkirk – Antwerp – Bremen – Wilmington, NC – Veracruz – Altamira – New Orleans – Port Everglades – St. John's (Antigua)**
Руководитель практики	**Second Officer Tanase Adrian Alexandru**
Дата начала – окончания	**03.03.2019 – 09.05.2019**

Выполнил: Курсант 0151 гр.

ВЫОНГ ХАЙ

Проверили: Преподаватели

Кафедра судовождения, «Навигация и лоция» _____

Кафедра судовождения, «Мореходная астрономия» _____

Кафедра управления судном _____

Кафедра технических средств судовождения _____

MV Arubaborg

2019

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STATUS *Updating, Modifying and Improving...*

PREFACE

Dear **Wagenborg Shipping B.V.**, The Company and The Staffs,

Dear **Mr. Cees Horvers**,

Dear **Mr. Mark Hoving** and **Mr. Nick Bolt**,

Dear **Ms. Liz Dijk**,

First of all, I would like to express my great appreciation to all of you. It has been a pleasure and honored time for me to work in Wagenborg, and to work with you, Madams and Sirs.

As I have promised since the beginning, "I will try my best.", and recently, I have just fulfilled my commitment – the last apprenticeship has been finished, which opens a grand new start.

THE PROJECTS

As to this last period of training, there are two projects completed:

1. Diploma thesis – **Use of analytic geometry for task solution on maneuvering board**
2. **Shipboard Training Assignment**

I have printed out the projects and ask the Captain to kindly send to the Wagenborg office for inspection and suggestion. There are two attachments, which are in two folders/ books.

The diploma thesis "*Use of analytic geometry for task solution on maneuvering board*" is thought up and developed by me. Please refer to the other folder/ book.

As to the Shipboard Training Assignment, which is named "*The Junior Officer's Handbook*", there are seven chapters to be defended in different faculties/ departments at the University:

No.	Faculty / Department	Chapter(s) to be defended
1	Navigating Faculty, "Navigation" Subject	Chapter 1 – Navigation and sailing directions Chapter 4 – Meteorology
2	Navigating Faculty, "Nautical Astronomy" Subject	Chapter 2 – Nautical astronomy
3	Ship Handling Faculty	Chapter 3 – Ship handling and manoeuvring Chapter 5 – Maritime English
4	Navigational Technical Equipment Faculty	Chapter 6 – Electro-navigational equipment Chapter 7 – Radio-navigational equipment

Furthermore, there is a special requirement from the University concerning the writing, in which the assignment must be written manually, i.e. by **handwriting**.

Therefore, I have to re-write all the chapters again by hand, besides the printing version.

The assignment is made with references from many sources of information:

+ English reference navigation books
+ Russian lectures and reference books
+ Bridge and deck equipment manuals
+ SOM
+ IMO publications (conventions, regulations and books)

etc.

Besides, many knowledges are collected from my own experience and the officers' sharing.

Please kindly take a look at both the projects, from which **the performed works on board**, **the navigational and astronomical observations at sea**, **the knowledge** and **the passion** are to be shown.

REWIND OF THE PAST

Totally, there are five projects/ assignments, which have been made during the shipboard training periods on Wagenborg vessels.

No.	Vessel	Projects
1	MV Schieborg – 2016	The voyage plan "Zeebrugge – Gothenburg" and Additional works
2	MV Reggeborg – 2017	The assignment "Loading of grain wheat. Stability calculation.", Draft survey and Additional works
3	MV Andesborg – 2018	The special project: The IAMU Student Conference
4	MV Arubaborg – 2019	The diploma thesis "Use of analytic geometry for task solution on maneuvering board" The "Shipboard Training Assignment"

FUTURE PLAN

After signing off the MV Arubaborg, I am going back to the University for examination and graduation.

Time	Event
End of May, 2019	Defense of Shipboard Training Assignment Preparation for the final state examination
June, 2019	The final state examination and The COC examination
July – August, 2019	The academic work (i.e. Development of Diploma thesis)
End of August, 2019	Defense of Diploma thesis and Graduation
September – December, 2019	Reporting to UT-STC (Formalization and translation of Diploma and COC, etc.) Vacation
December, 2019 – January, 2020	First contract as a Third Mate

Please kindly inspect both the projects, and do not hesitate to advise me with your recommendations and suggestions to make them better, as well as myself.

MV Arubaborg, May 9, 2019

Deck Apprentice **Hai Vuong**

APPRECIATION

The projects are made with knowledge and passion,
as special thanks to:

WAGENBORG SHIPPING B.V.	*The Company and The Staffs* Mr. **Cees Horvers**, Mr. **Mark Hoving**, Mr. **Nick Bolt** and Ms. **Liz Dijk**
Admiral Nevelskoy **Maritime State University**	*The kind and experienced teachers, professors and advisors* Specially Mr. **Slivaev B. G.** / **Сливаев Борис Геннадьевич**
Fescontract-International	Mr. **Nikolai Ivanushkin**
The **MV SCHIEBORG** of Summer 2016	*The kind crewmembers* Specially, *Chief Mate* **Roel Steenbergen** and *Chief Mate* **Ivar Onnes**
The **MV REGGEBORG** of Summer 2017	*The kind crewmembers* Specially, *Chief Mate* **Pisaltu Florin** and *Second Mate* **Schaafsma Daniel J.A.**
The **MV ANDESBORG** of Summer 2018	*The kind crewmembers* Specially, *Chief Mate* **Reen Adrianus Jan van** and *Third Mate* **Joy Cumapon**
The **MV ARUBABORG** of Spring 2019	*The kind crewmembers* Specially, *Captain* **Vitulescu Dorel**, *Chief Mate* **Aliciu Alexandru**, *Chief Mate* **Grecu Cezar**, *Second Mate* **Tanase Adrian Alexandru**, *Second Mate* **Calust Radu** and *Third Mate* **Errol Pajaron**

With full respect and great appreciation.

1 NAVIGATION AND SAILING DIRECTIONS

НАВИГАЦИЯ И ЛОЦИЯ

CHAPTER'S CONTENT

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1.1 BRIDGE ARRANGEMENT DRAWING

Схемы размещения радионавигационных приборов и технических средств судовождения на мостике судна

Statement of Fact:

There is a similar bridge arrangement drawing, which was drawn manually by the author during the shipboard training period on the MV Schieborg (in 2016) and was submitted to the Wagenborg office.

As to this recent shipboard training period, it is not necessary to be drawn by hand. Since the bridges' arrangements and their equipment are almost similar. Besides, it is more important to know where those shipyard drawings can be found, how to read and understand them, and to study their equipment.

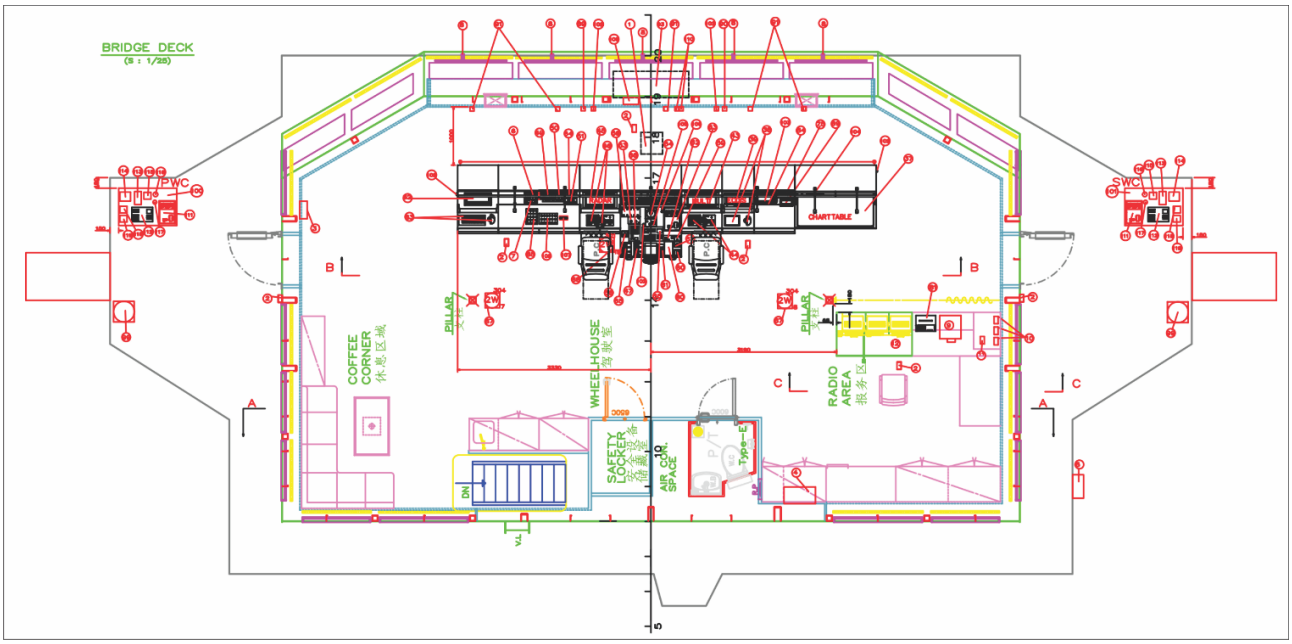


Figure 1.1.1. Arrangement of wheelhouse, chart and radio space [1.1]

The focused navigational technical equipment/ aids:

	Magnetic compass		Autopilot		Log speed
	Gyro compass		ECDIS		Echo-sounder
	GPS receiver		Radar		ARPA
	NAVTEX receiver		GMDSS equipment		AIS

1.2 MAGNETIC COMPASS DEVIATION TABLE

Таблица девиации магнитного компаса

1-800-624-6389
Fax: 1-908-757-0729
magnetx@comcast.net

U.S. Coast Guard
Licensed Personnel

Professional Compass Adjustments

College Park Marine, Inc.

Commercial & Military Vessels

300 Maple Ave., Suite 203, South Plainfield, New Jersey 07080

TABLE OF RESIDUAL DEVIATION

Vessel: **MV ARUBABORG**
Agent/Owner: Wilhelmsen
Compass Make: **Cassens & Plath** Model: **A290504**
Position: $\boldsymbol{\varphi = 39° 55.0'N, \lambda = 075° 08.0'W}$ Date: **06th September 2018**

Ship's Head Magnetic	DEVIATIONS		Ship's Head Magnetic	DEVIATIONS	
	Standard Compass	Steering Compass		Standard Compass	Steering Compass
000°	**−2.8°**		180°	**+1.2°**	
015°	**−3.0°**		195°	**+0.5°**	
030°	**−3.5°**		210°	**0.0°**	
045°	**−3.8°**		225°	**−0.8°**	
060°	**−3.5°**		240°	**−0.8°**	
075°	**−2.5°**		255°	**−1.0°**	
090°	**−1.8°**		270°	**−1.0°**	
105°	**−1.0°**		285°	**−1.0°**	
120°	**0.0°**		300°	**−1.5°**	
135°	**+1.2°**		315°	**−2.0°**	
150°	**+1.2°**		330°	**−2.0°**	
165°	**+1.2°**		345°	**−2.8°**	
180°	**+1.2°**		000°	**−2.8°**	

A check of compass deviations should be completed at least once yearly to account for magnetic decay and/or changes. Industry and military standards recommend that a magnetic compass be professionally inspected and adjusted annually.

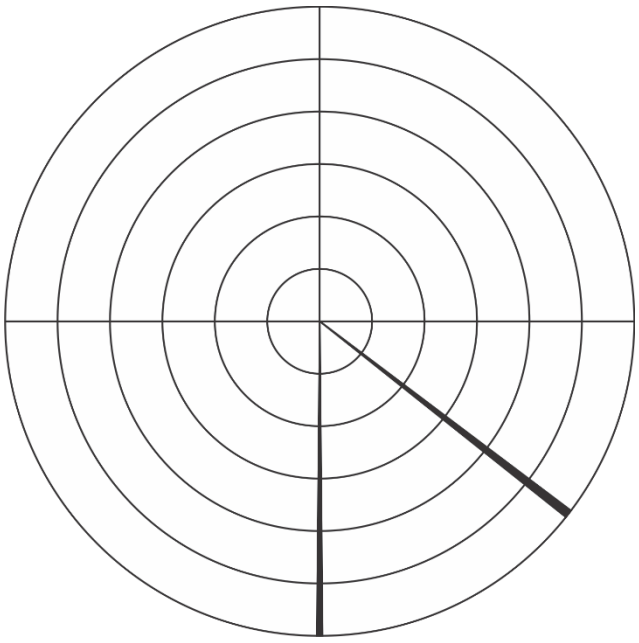
Adjusted By: (signed) Date: 06th September 2018

Figure 1.2.1. Table of residual deviation [1.2]

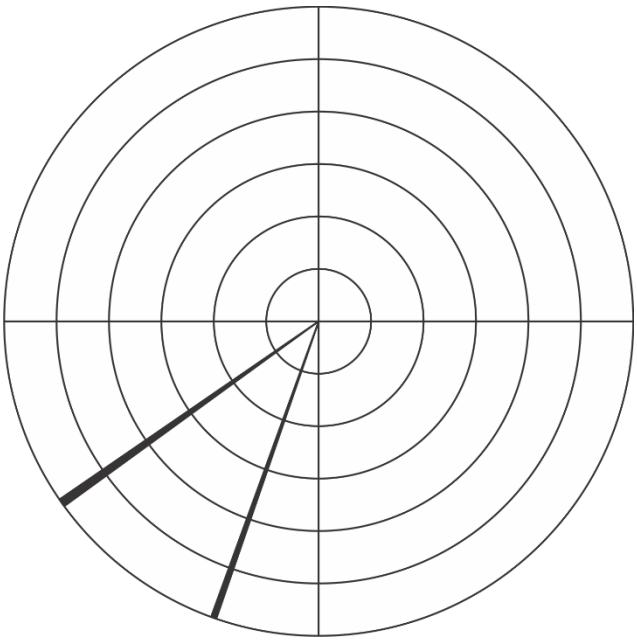
1.3 RADAR BLIND SECTOR DIAGRAM

Графики секторы затенения РЛС

S-band
$f = 3\ GHz, \lambda = 10\ cm$



X-band
$f = 10\ GHz, \lambda = 3\ cm$



$127.0° - 128.5°$
$179.5° - 180.5°$

$199.0° - 200.0°$
$234.0° - 235.5°$

Figure 1.3.1. Radar blind sector diagram [1.3]

1.4 TABLE OF WATCHKEEPING HOURS

Таблица учёта ходового времени

No.	Voyage	Departure	Arrival	DTG (nautical mile)	Watchkeeping (hours)
1	**Sheerness – Dunkirk**	08.03.2019	08.03.2019	93.0’	2
2	**Dunkirk – Antwerp**	20.03.2019	21.03.2019	147.0’	–
3	**Antwerp – Bremen**	21.03.2019	23.03.2019	346.1’	7.5
4	**Bremen – Wilmington, NC**	28.03.2019	11.04.2019	4178.5’	46.5
5	**Wilmington, NC – Veracruz**	13.04.2019	20.04.2019	1671.0’	24
6	**Veracruz – Altamira**	22.04.2019	23.04.2019	244.0’	4
7	**Altamira – New Orleans**	24.04.2019	27.04.2019	698.4’	16
8	**New Orleans – Port Everglades**	30.04.2019	03.05.2019	895.0’	12
9	**Port Everglades – St. John’s (Antigua)**	03.05.2019	07.05.2019	1257.0’	12

1.5 TABLE OF NAVIGATIONAL OBSERVATIONS

Таблица учёта общего числа обсерваций

No.	Voyage	Observations/ Fixing the position			
		Visual	Radar	GPS	Miscellaneous
1	**Sheerness – Dunkirk**			☑	
2	**Dunkirk – Antwerp**			☑	
3	**Antwerp – Bremen**			☑	
4	**Bremen – Wilmington, NC**			☑	☑
5	**Wilmington, NC – Veracruz**			☑	☑
6	**Veracruz – Altamira**	☑	☑	☑	☑
7	**Altamira – New Orleans**	☑	☑	☑	☑
8	**New Orleans – Port Everglades**			☑	☑
9	**Port Everglades – St. John's (Antigua)**			☑	

1.6 BRIDGE LOG BOOK ENTRIES

Записи судового журнала

EXTRACTS FROM THE BRIDGE LOG BOOK

Cover:

DECK AND RADIO LOG (GMDSS)

NUMBER	##		
SHIP NAME	**MV ARUBABORG**		
STARTING	dd.mm.yyy	**ENDING**	dd.mm.yyy

Page I:

DECK LOGBOOK AND RADIO LOGBOOK (GMDSS)

Vessel	MV ARUBABORG		
Covering the period from		till	year
Call sign	PCCY		

Port of registry	DELFZIJL, THE NETHERLANDS

Trading area according to the Certificate of Seaworthiness	Worldwide

Master		*from*	*till*
		from	*till*

Person designated to handle emergency and safety traffic

		from	*till*
		from	*till*

This logbook contains 12 pages of various records numbered I up to and including page XII, 88 numbered daily pages, 36 pages port log and/or supplement to a logbook page, 88 pages radio log; consecutively numbered 1 – 212.

Page I	*Logbook records*
Page II	*Dutch Shipping Laws*
Page III	*Index*
Page IV	*(idem)*
Page V	*Lifeboat exercises*
Page VI	*Load Line*
Page VII	*Draught arrival, departure*
Page VIII	*(idem)*
Page IX	*(idem)*
Page X	*Ship's articles*
Page XI	*(idem)*
Page XII	*(idem)*
Page 1 to and incl. 88	*Sea log*
Page 89 to and incl. 124	*Port log*
Page 125 to and incl. 212	*Radio log (GMDSS)*

Numbering pages verified by

Initials			

Page II:

This Logbook is to be kept up in accordance with:
Art. 348 and 349, Commercial Code (general handling of the Logbook); the Order in Council for the execution of the art. 349 Commercial Code (keeping the Logbook);
Art. 351, Commercial Code (advice from the crew);
Art. 27, Law Seafarers (refusal of permission to leave the ship);
Art. 19a, Civil Law, Book I (register of birth on board);
Art. 25, Decree on funeral services (register of death on board, as well as throwing overboard corpses);
Art. 9, first paragraph, under h of the Ship's Act (making notes of what, in compliance with the under b up to and including g of that paragraph-imposed obligation, has happened);
Art. 10, Manning Act (drawing up or adjusting of the ship's articles);
Art. 43, fourth paragraph of the Seaman's Decree (inspection provisions and potable water, rooms and equipment used for the keeping and handling of provisions and potable water as well as the galley and every other room used for the preparation and serving up of the meals);
Art. 63, of the Seaman's Decree (inspection of quarters);

Art. 42, Act of the provision of medicines (breach of the rules of this Act);
Art. 47, of the Seaman's Decree (extracting destination accommodations);
Art. 63, of the Seaman's Decree (cleanliness of the accommodations);
Art. 4.6, paragraph 2, Regulation Seafarers (inspection of food and drinking water);
Art. 3.20, paragraph 2, Regulation Seafarers (inspection of accommodations);

The index must be filled immediately and completely.
It is allowed to use the index with for other subjects.

Pages III, IV:

INDEX OF LOG ENTRIES

Subjects	***Date of the last note of the previous Logbook***	***Page of the Logbook***
SOCIAL PARAGRAPH *1. Sickness and accidents of those on board.*		
2. Death or birth of those on board, burial at sea.		
3. Discharge or absence without leave or termination of the contract by crew, also wages and clothes of this former crew.		
4. Refuse permission for shore leave.		
5. Advice ship's council, advice safety committee, members of safety committee.		
6. Inspection of accommodation, stores, fresh/ potable water-tanks.		
7. Inspection of legal Regulation on the supply of medicines.		
ACCIDENTS AND UNEXPECTED INCIDENTS *1. Collisions, damage, grounding and other accidents, exceptional incidents.*		
2. Defects to ship, engine or equipment.		
3. Inspection by qualified authorities.		
4. Drydocking or other means of carrying out a hull survey.		
5. Not rendering assistance to persons, ships and planes in distress, emergency traffic VHF.		
6. Defects/ repairs navigation instruments.		
7. Loss of deck cargo/ report.		
FIRE PREVENTION		

1. Inspection of the fire-fighting equipment, testing the pressure of gas-cylinders, control breathing apparatus pressure.		
2. Control fixed fire-fighting installation(s).		
3. Testing fire detection system.		
TECHNICAL TESTINGS *1. Inspection of life-saving appliances*		
2. Testing and inspection of watertight doors, port holes, valves, shut-off valves, access port and other gaps.		
3. Testing electrical emergency installations.		
4. Testing steering gear (main and auxiliary), control of emergency steering gear.		
5. Adjustment of magnetic compass/ radio direction finder.		
CARGO *1. Dangerous goods on board of passenger ships.*		
2. Deck cargo height, ballast tanks soundings by beginning voyage, control lashings with reference to the timber trade.		
3. Remote sounding control for tanks.		
4.		

Page VI:

EXERCISES: "ABANDON SHIP", "MAN OVERBOARD", "RESCUE BOAT(S)"

Date and place	***Roll call and instruction***	***Which boat/ life-raft***	***Lowered resp. turning outboard***	***Inflated resp. lowered into the water and sailed***	***Condition of life-saving appliance and equipment***	***Signature Master***
Latest exercises copied from the previous logbook						
Exercises during usage of this logbook						

Page VI:

ABSTRACT OF THE INTERNATIONAL/ NATIONAL LOAD LINE CERTIFICATE
No. _____

Freeboard assigned as		*Type of ship*	Type A
			Type B
New ship	*Existing ship*		Type B with reduced freeboard
			Type B with increased freeboard

Length (L) as defined (in metres)
articles 2 (8) of the International Convention on Load Lines, 1966
articles 2 (1) of the appendix 1 of the Dutch Shipping Order, 1965

Load line		*Freeboard from deck line*	*Upper edge of line at the level of the centre of the circle*
Tropical	T	3426 mm,	202 mm above (S).
Summer	S	3628 mm,	
Winter	W	3830 mm,	202 mm below (S).
Winter North Atlantic	WNA	____ mm,	___ mm below (S).
Timber tropical	LT	____ mm,	___ mm above (LS).
Timber summer	LS	____ mm,	___ mm above (S).
Timber winter	LW	____ mm,	___ mm below (LS).
Timber winter North Atlantic	LWNA	____ mm,	___ mm below (LS).

Allowance for fresh water for all freeboards other than timber	205 mm.
Allowance for fresh water for timber freeboards	___ mm.

The upper edge of the deck line from which these freeboards are measured is	30 mm	deck at side.

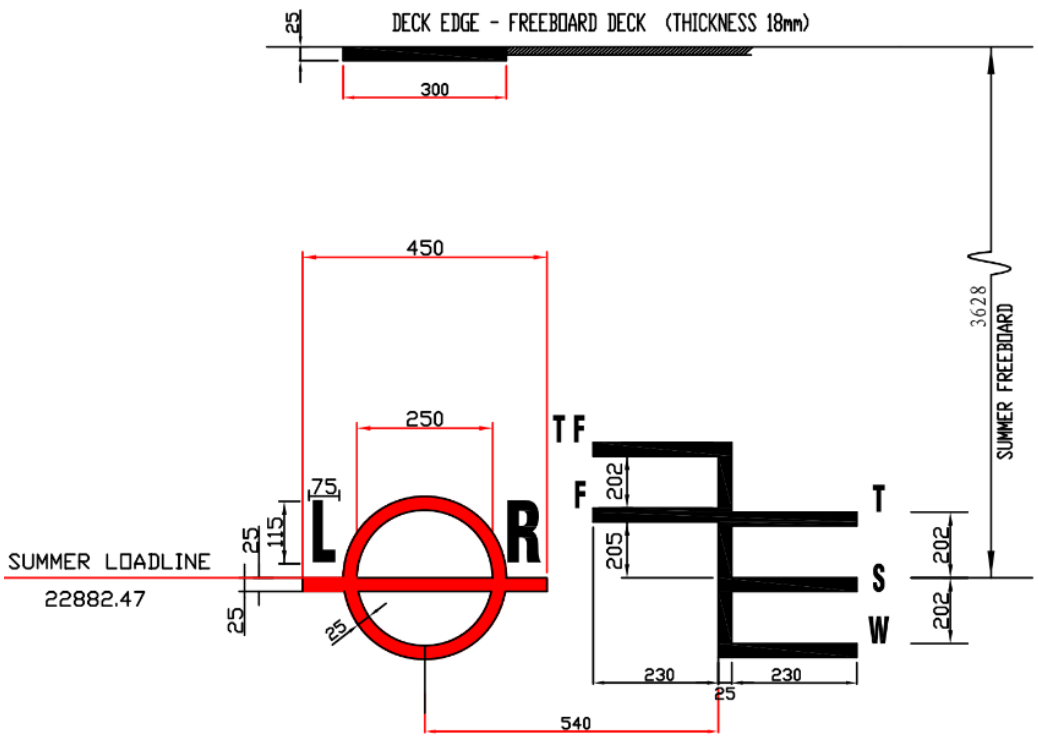


Figure 1.6.1. The Plimsoll mark [1.6]

Pages VII, VIII, IX:

DRAUGHT AND POSITION OF THE PLIMSOLL MARKS IN RESPECT TO THE WATER LINE

Harbour and date *A – arrival* *V – departure*			*Time*	*Draught*		*Distance from the middle of the circle of the Plimsoll marks as far as the water line (load line)*		*Density of the water*	*Signature Master*
				Forward	*Aft*	*Starboard*	*Port*		
A	V								
A	V								

Pages X, XI, XII:

SHIP'S ARTICLES, DRAWN UP, ADDITIONAL ENTRIES

Date, place	*Date and No. ship's articles*	*Page in log*	*Name and signature of Master*

Pages 1 – 88:

DECK LOGBOOK

Voyage No.	*Charter voyage No.*	*Sailing in*
02/2019	**1/2019 Hugo Stinnes**	**N Atlantic, Bermuda**

Watch	*Time*	*Distance run acc. log*	*Course steered*			*Variation*	*Deviation standard compass*	*Made good*		*RPM of the propeller*
			Gyro compass	*Steering compass*	*Standard compass*			*Course*	*Distance*	
0000										
HW	04.00		266°		283°	-16°	-1°	266°	52’	72%
		3518’								
0400										
DW	04.00		266°		283°	-16°	-1°	266°	50’	72%
		3568’								
0800										
VW	04.00		266°		283°	-16°	-1°	266°	48’	72%
		3616’								
1200										
AM	04.00		266°		283°	-14°	-3°	266°	47.5’	72%
		3663.5’								
1600										
PV	04.00		266°		283°	-14°	-3°	266°	47’	72%
		3710.5’								
2000										
EW	04.00		266°		282°	-13°	-3°	266°	47’	72%
2400		3757.5’								

From	*To*	*Day*	*Month*	*Year*
Bremen	**Wilmington, NC**	**Tuesday 9th**	**April**	**2019**

Direction of the wind and wind-force, weather, sea, barometer and temperature		***Pump-, tank- and bilges soundings***	***Entries for azimuth bearing, navigational and other events***
Wind	W 3	WB 7 PS Full,	0000 – 0200 Lookout AB Eugene
Weather	Clouded	All other BW tanks empty	0200 – 0400 Lookout AB Glen
Sea	Moderate	Bilges are empty	0200 GPS 33° 55.8’ N, 063° 38.2’ W
Swell	N – Low		0400 GPS 33° 54.0’ N, 064° 09.9’ W
Height of the barometer	1013 hPa	Daily toolbox and	Easy going vessel. Good visibility.
Temperature (air)	+20 °C	safety committee carried out	Fire and safety rounds carried out.
Temperature (sea water)			
			H.O.W. acc. To SOM 13.5.4 (2/O signed)
Wind	W 5/6	Daily inspection of lashing	0400 – 0600 Lookout Bosun
Weather	P. Clouded	carried out	
Sea	Moderate		0800 GPS 33° 50.7’ N, 065° 09.7’ W
Swell	W – Low		
Height of the barometer	1013 hPa		Easy going vessel. Good visibility.
Temperature (air)	+20 °C		
Temperature (sea water)			
			H.O.W. acc. To SOM 13.5.4 (C/O signed)
Wind	SW 6		1200 GPS 33° 47.6’ N, 066° 07.6’ W
Weather	Blue sky		
Sea	Moderate		Easy going vessel. Good visibility.
Swell	W – Low		
Height of the barometer	1011 hPa		
Temperature (air)	+21 °C		
Temperature (sea water)			
			H.O.W. acc. To SOM 13.5.4
Wind	SW 6		1400 GPS 33° 45.9’ N, 066° 36.2’ W
Weather	P. Cloudy		1600 GPS 33° 44.3’ N, 067° 04.7’ W
Sea	Moderate		
Swell	W – Low		Easy going vessel. Good visibility.
Height of the barometer	1009 hPa		
Temperature (air)	+21 °C		
Temperature (sea water)			
			H.O.W. acc. To SOM 13.5.4 (2/O signed)
Wind	SSW 6		1800 GPS 33° 42.8’ N, 067° 34.3’ W
Weather	Overcast		2000 GPS 33° 41.3’ N, 068° 00.7’ W
Sea	Moderate		
Swell	W – Moderate		Easy going vessel. Good visibility.
Height of the barometer	1007 hPa		
Temperature (air)	+21 °C		
Temperature (sea water)			
			H.O.W. acc. To SOM 13.5.4 (C/O signed)
Wind	W 3		2200 GPS 33° 39.8’ N, 068° 29.7’ W
Weather	Clouded		0000 GPS 33° 38.2’ N, 068° 56.7’ W
Sea	Moderate		
Swell	N – Low		2200 – 0000 Lookout AB Datur
Height of the barometer	1013 hPa		
Temperature (air)	+20 °C		Easy going vessel. Good visibility.
Temperature (sea water)			Sea water spray over forecastle and deck.
			H.O.W. acc. To SOM 13.5.4 (3/O signed)

Observed position:

At	*Ht (m)*	*By Sun/ Moon/ Star*	*Latitude*	*Longitude*
			$00°00.0'N/S$	$000°00.0'E/W$

Observed standard compass error:

At	*Ht (m)*	*By Sun/ Moon/ Star*	*On course*	*Error*

Estimated position at noon	*True course*	*Estimated made good*	*True made good*
$33°47.6'N, 066°07.6'W$	266°	24 hrs, 304 nm, 12.66 kn	288.5 hrs, 3616 nm, 12.53 kn DTG = 643.5 nm

Consumptions	*Fuel (tons)*	*Feed water (tons)*	*Drinking water (tons)*
Remainder yesterday noon			
Consumption last 24 hours			
Remainder today noon			

GMDSS Radio Log page	*Day*	*Year*	*Log keeper*	*Master*
126	Tuesday 09th April	2019	(signed)	(signed)

Pages 89 – 124:

PORT LOG
and/or supplement to the logbook page No. _____

Date and Port	*Events, remarks, etc.*

Pages 125 – 212:

Vessel	*Day*	*Month*	*Year*
MV Arubaborg	Friday 26th	April	2019

RADAR LOG

Time		*Reason for use, maintenance carried out*	*State of the equipment, remarks*
On	*Off*		
00.00	24.00	X-band, S-band	Tx. In good order.

RADIO DIRECTION FINDER LOG

Time	*Station*	*Distance off*	*True bearing*	*OBS bearing*	*Error*

RADIO ROOM BATTERY LOG

Loaded battery	*Battery fully loaded*	*Maintenance carried out*
from: Auto *till:*	*Yes* *No*	Weekly

RADIO COMMUNICATIONS LOG

Reported departure/ arrival	*Time*	*To coast station*

PROMINENT CONTACTS

In/ Out	*Means*	*Coast station*	*Message No.*	*Time*
OUT	VHF Ch 16/09	SW Pass Pilots	1	18.30
OUT	VHF Ch 16/09	SW Pass Pilots	2	20.00

SPECIAL OCCURRENCES

- *Summary MAYDAY, PAN, TTT traffic, MSI*
- *Interruptions radio watch*
- *Weekly check battery*
- *Check lifeboat installations*

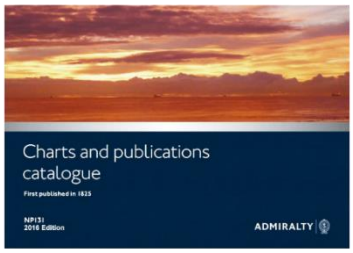
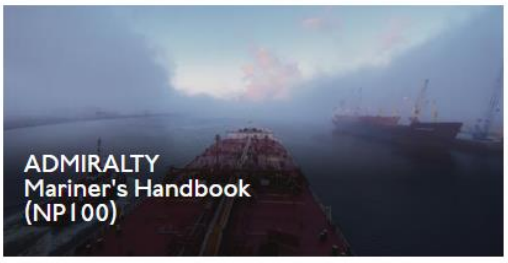
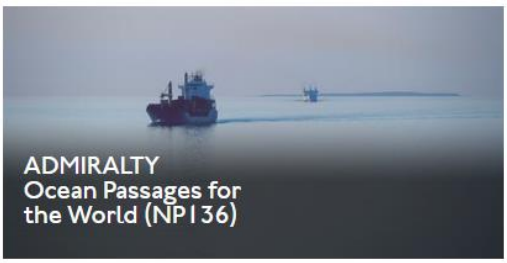
Time	*Events*
00.00	Continue radio watch acc. To GMDSS regulations in MF/HF 2182 kHz and VHF/VHF DSC Ch 16/70.
	Daily checks of GMDSS equipment carried out.

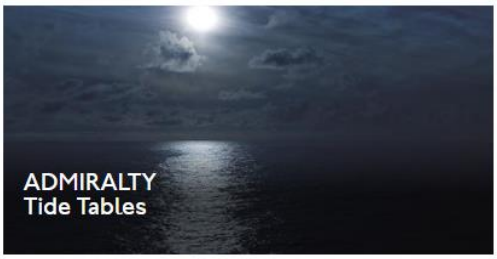
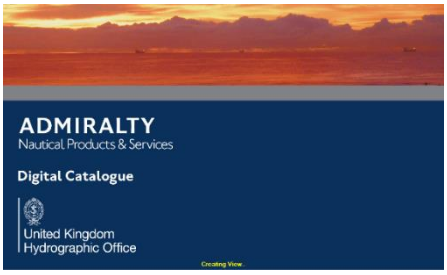
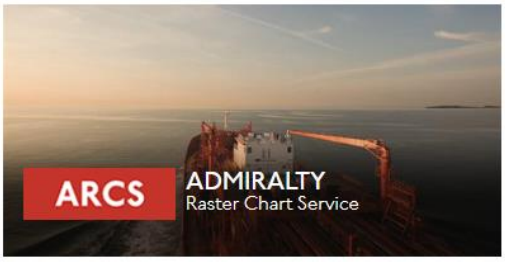
Master	*Person designated to handle emergency and safety traffic*
(signed)	(signed)

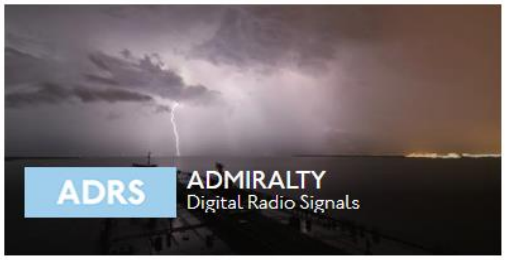
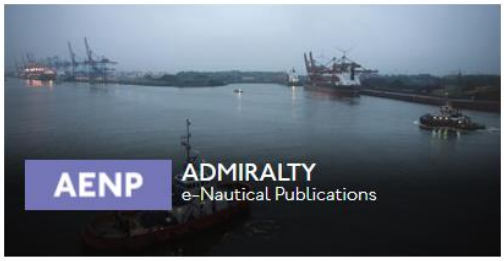
1.7 NAUTICAL CHARTS AND PUBLICATIONS

Судовая коллекция карт и пособий. Процедура заказа, получения и хранения карт и пособий. Использование отечественных и зарубежных карт и пособий. Корректура отечественных и иностранных карт и пособий.

NAUTICAL CHARTS AND PUBLICATIONS

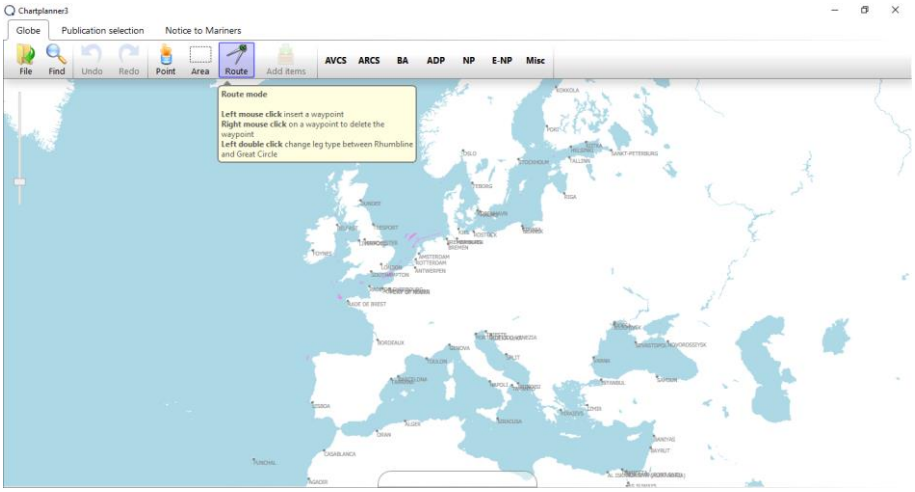
No.	Product	
	PAPER PRODUCTS	
1	Catalogue of ADMIRALTY Charts and Publications NP131	
2	Navigational Charts Standard Nautical Charts numbered 1 to 4999	
3	Mariner's Handbook NP100	
4	Ocean Passages for the World NP136	

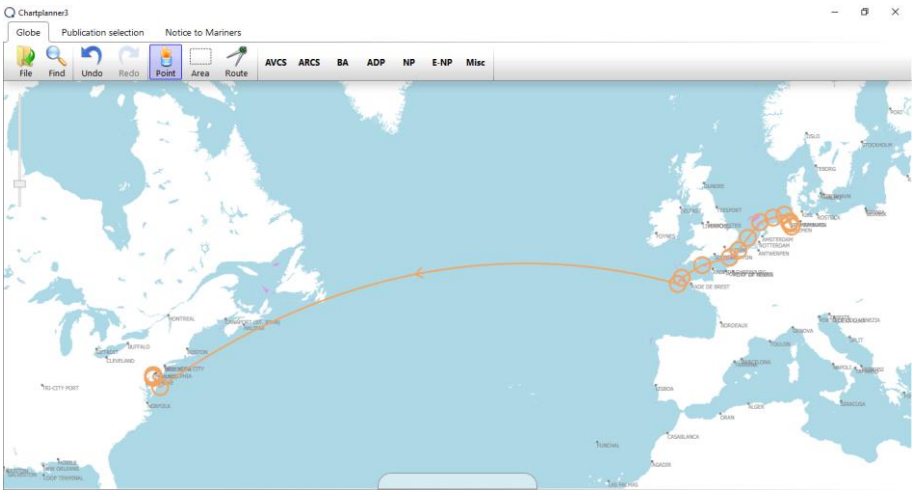
5	ADMIRALTY Sailing Directions NPs 1 – 72	
6	Tidal Publications ADMIRALTY Manual of Tides (NP120) ADMIRALTY Tide Tables (NPs 201 – 208) ADMIRALTY Tidal Stream Atlases (NPs 209, 218 – 222, 233, 249 – 259, 263 – 265, 337) Co-Tidal Atlases (NPs 214 – 215) Dover, times of High Water and mean ranges (NP164)	
7	Celestial Publications The Nautical Almanac (NP314) Star Finder and Identifier (NP323)	
	DIGITAL PRODUCTS	
8	ADMIRALTY Digital Catalogue (ADC)	
9	ADMIRALTY Vector Chart Service (AVCS)	
10	ADMIRALTY Raster Chart Service (ARCS)	

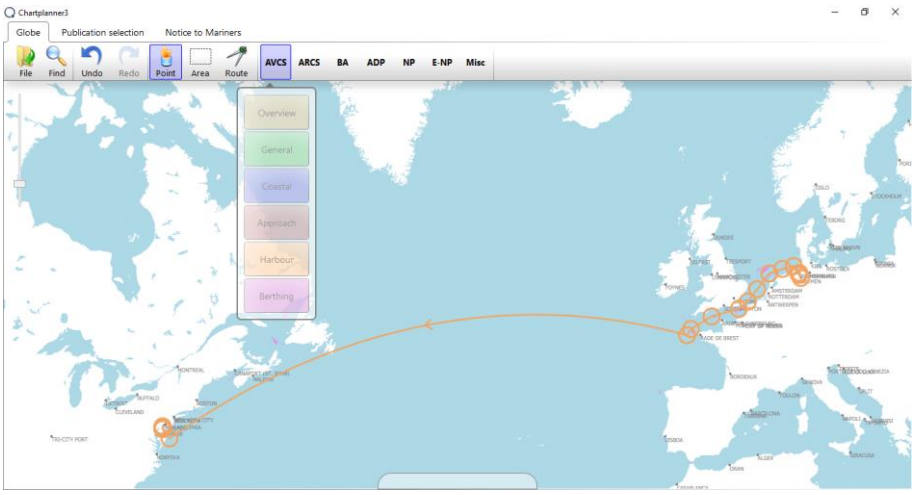
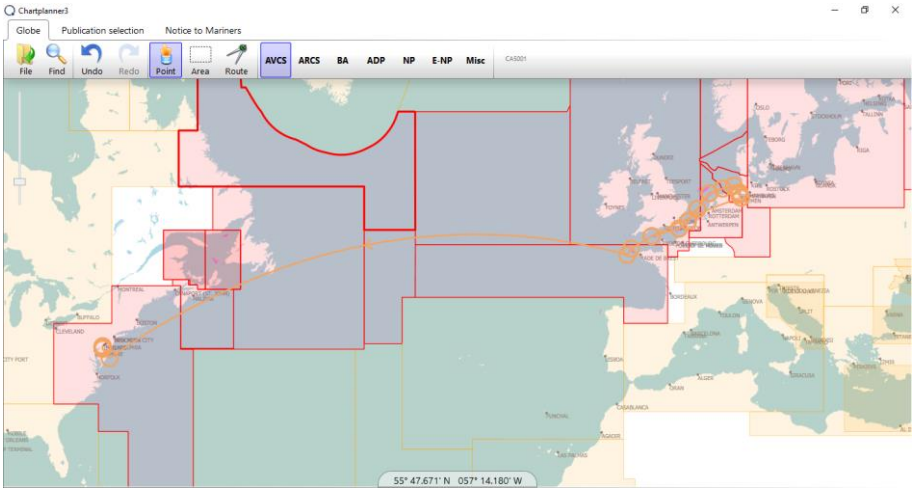
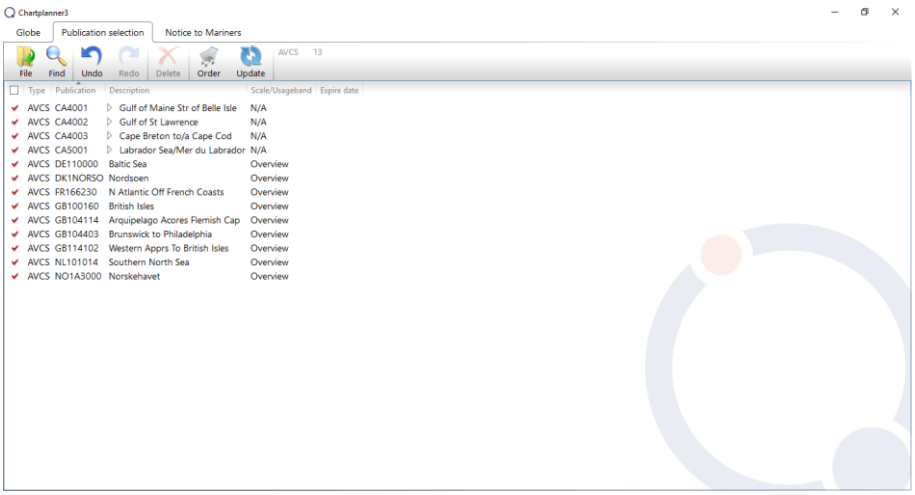
11	ADMIRALTY Digital Radio Signals (ADRS) ADMIRALTY Digital Radio Signals Volumes 1, 3, 4, 5 (ADRS 1, 3, 4, 5) – radio communication details for Maritime Radio and Meteorological Observation Stations, Maritime Safety Information Services and GMDSS. ADMIRALTY Digital Radio Signals Volume 2 (ADRS 2) – a range of compliant, digital positional and time keeping references that aid the calculations of positions and times worldwide. ADMIRALTY Radio Signals Volume 6 (ADRS 6) – essential information for 3,800 service locations worldwide, including detailed pilot, Vessel Traffic Service (VTS) and port information.	
12	ADMIRALTY Digital List of Lights (ADLL)	
13	ADMIRALTY TotalTide (ATT)	
14	ADMIRALTY e-Nautical Publications (AENPs)	

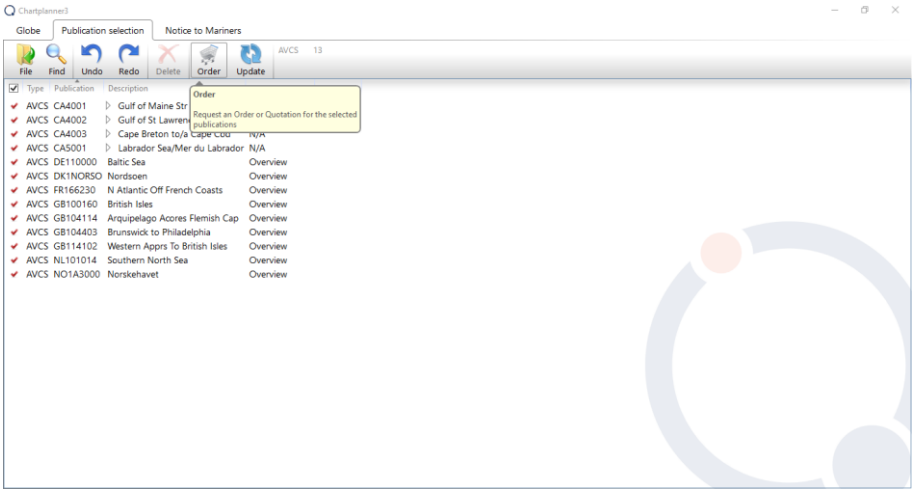
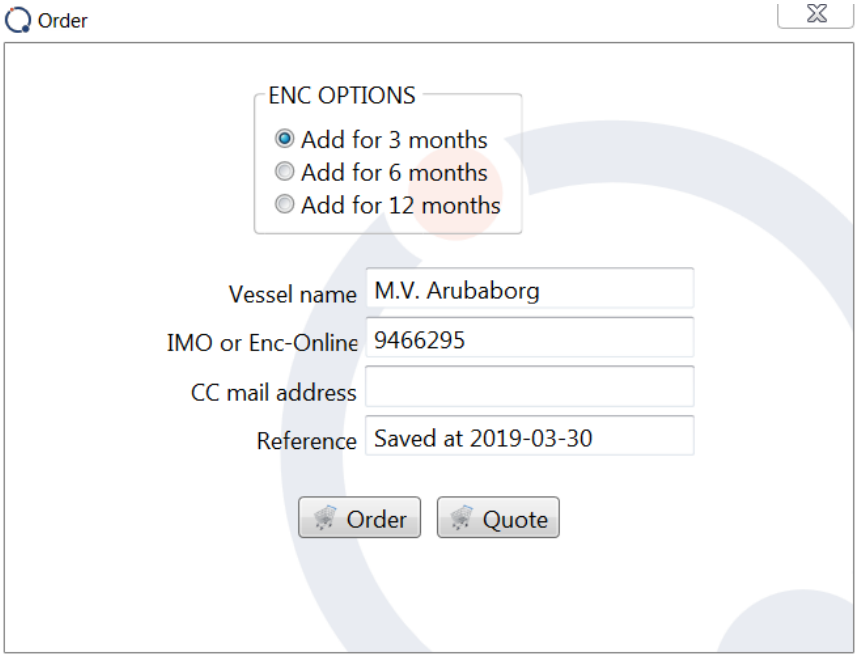
PROCEDURE OF ORDERING CHARTS AND PUBLICATIONS

Step	Explanation
1	Use Chartplanner3 to order necessary charts and publications, both paper and digital products.
2	Open the program. Drag the map and zoom to the sailing area.
3	Use “Route” to draw a preliminary voyage plan, from port A to port B.

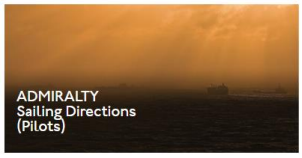
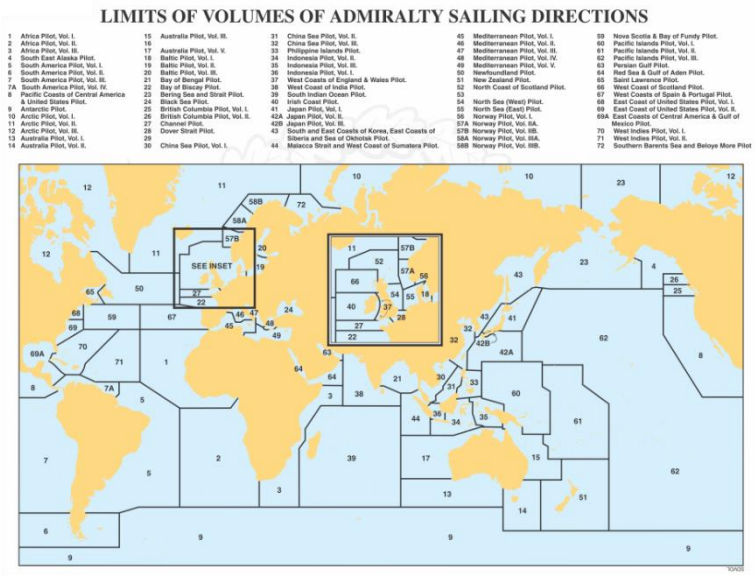
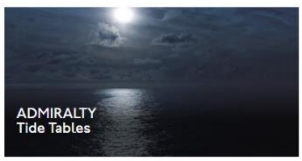
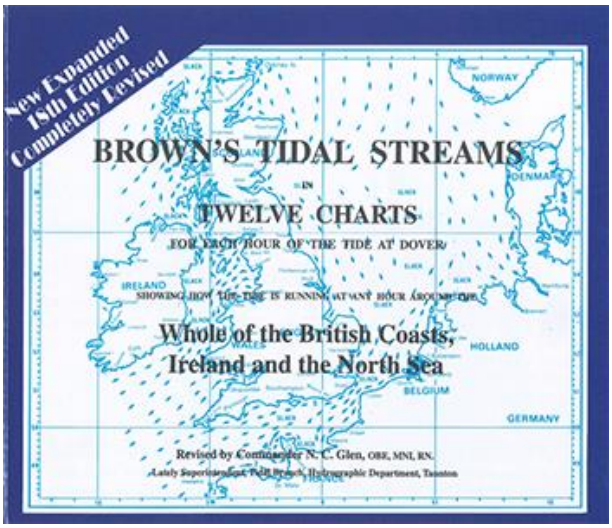


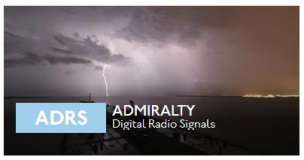
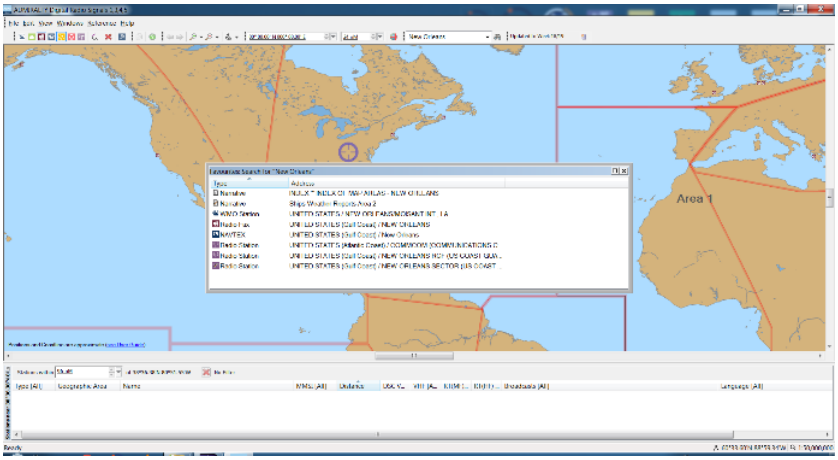
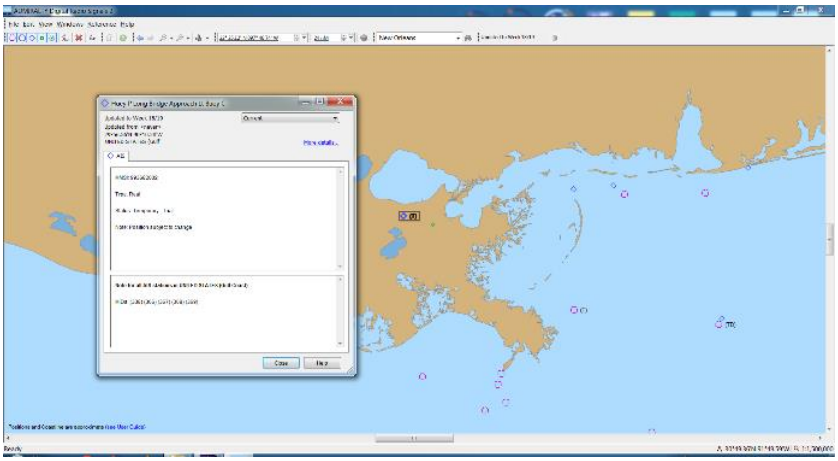


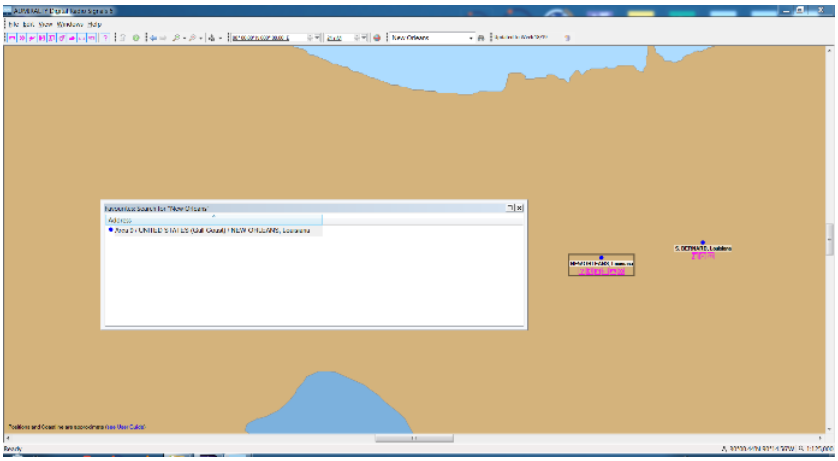
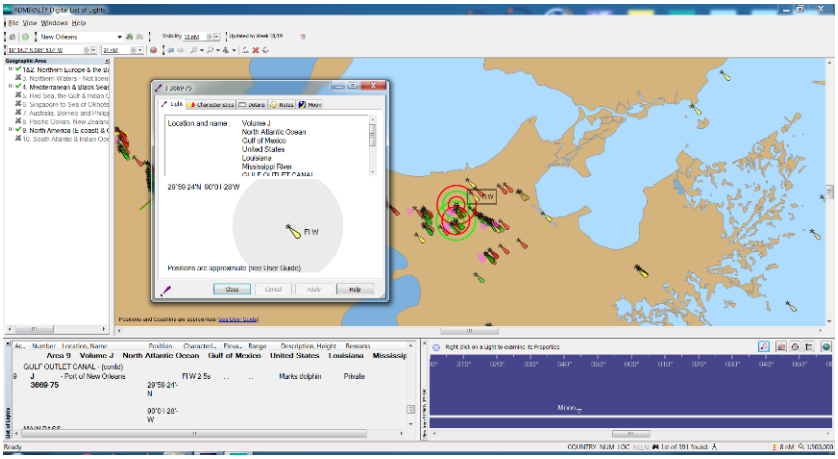
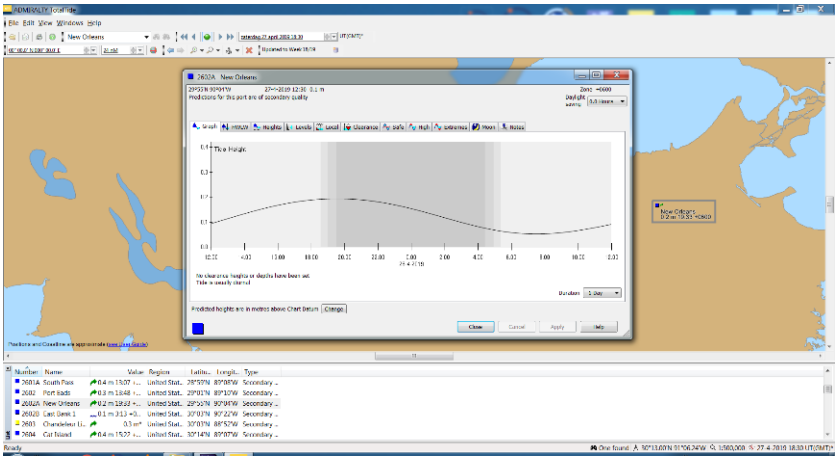
4	Choose the type of charts and publications, which are required for the voyage, both paper and digital products, i.e. AVCS, ARCS, BA, ADP, NP, e-NP, Misc. 
5	Choose the sub-catalogue for each main catalogue of charts and publications. Use “Point” to select on the map. 
6	All selected charts and publications are shown in “Publication selection”. 

7	Click “Order” to make an order form. 
8	Enter required information and send. 

USE OF ADMIRALTY CHARTS AND PUBLICATIONS

No.	Product	How-to Use
	PAPER PRODUCTS	
5	ADMIRALTY Sailing Directions NPs 1 – 72 	Choose the necessary volumes of the ADMIRALTY Sailing Directions, i.e. NP. Chapter 1 contains general information as well as natural conditions. Use the Index to find the area or the port of sailing. 
6	Tidal Publications ADMIRALTY Manual of Tides (NP120) ADMIRALTY Tide Tables (NPs 201 – 208) ADMIRALTY Tidal Stream Atlases (NPs 209, 218 – 222, 233, 249 – 259, 263 – 265, 337) Co-Tidal Atlases (NPs 214 – 215) Dover, times of High Water and mean ranges (NP164) 	***Statement of Fact:*** There is an absence of ADMIRALTY tide publications (paper products), as there are alternative publications, e.g. Brown's Tidal Stream and ATT. 

	DIGITAL PRODUCTS	
11	ADMIRALTY Digital Radio Signals (ADRS) ADMIRALTY Digital Radio Signals Volumes 1, 3, 4, 5 (ADRS 1, 3, 4, 5) ADMIRALTY Digital Radio Signals Volume 2 (ADRS 2) ADMIRALTY Radio Signals Volume 6 (ADRS 6) 	**ADRS 1,3,4,5** Choose the area, the port or any necessary location for radio communication details of Maritime Radio and Meteorological Observation Stations, Maritime Safety Information Services and GMDSS.  **ADRS 2** Choose the area, the port or any necessary location for a range of compliant, digital positional and time keeping references that aid the calculations of positions and times worldwide.  **ADRS 6** Choose the area, the port or any necessary location for essential information of service locations, including detailed pilot, Vessel Traffic Service (VTS) and port information.

		
12	ADMIRALTY Digital List of Lights (ADLL) 	Choose the area, the port or any necessary location for light characteristics and additional information. 
13	ADMIRALTY TotalTide (ATT) 	Choose the area, the port or any necessary location for tide graph, HW/LW and relevant information. 

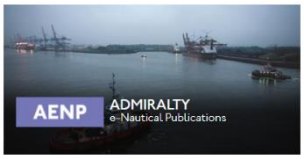
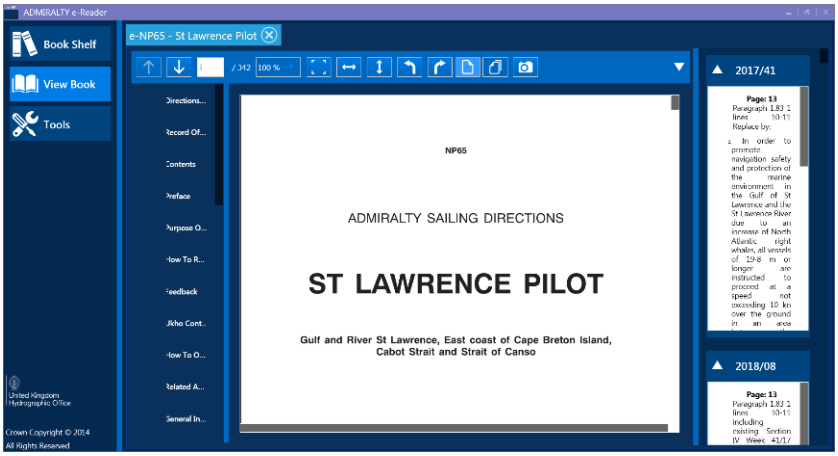
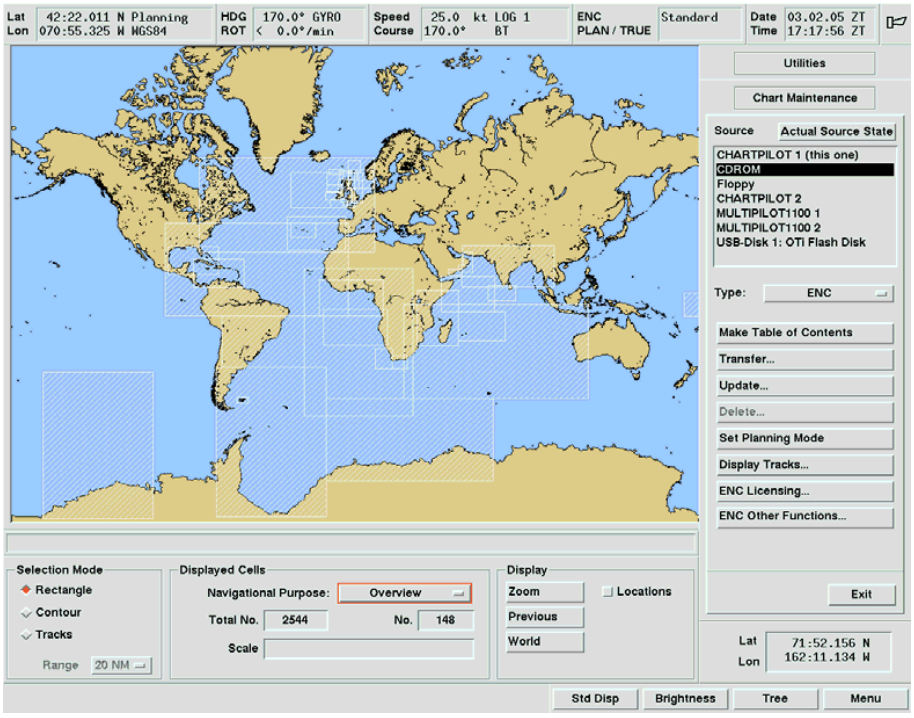
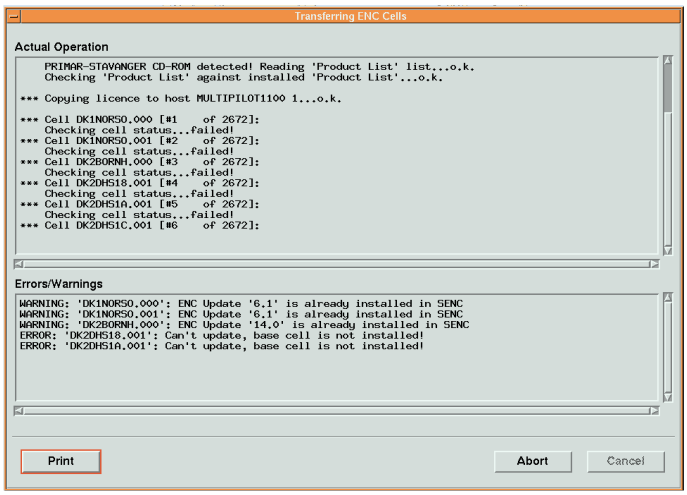
14	ADMIRALTY e-Nautical Publications (AENPs) 	Choose the digital publications for reading and references. 

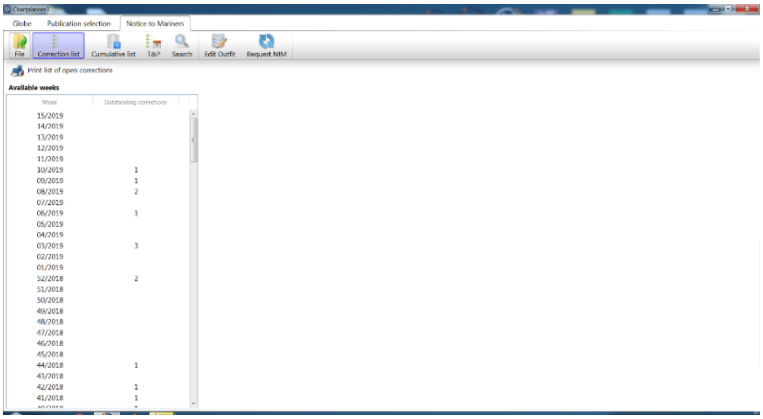
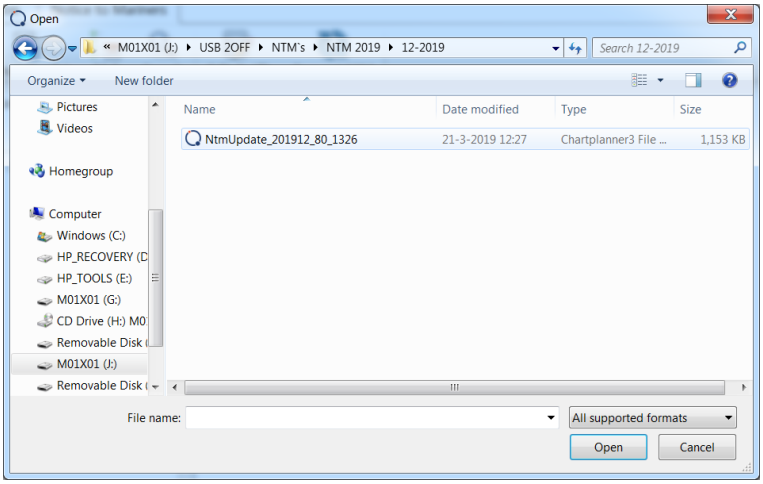
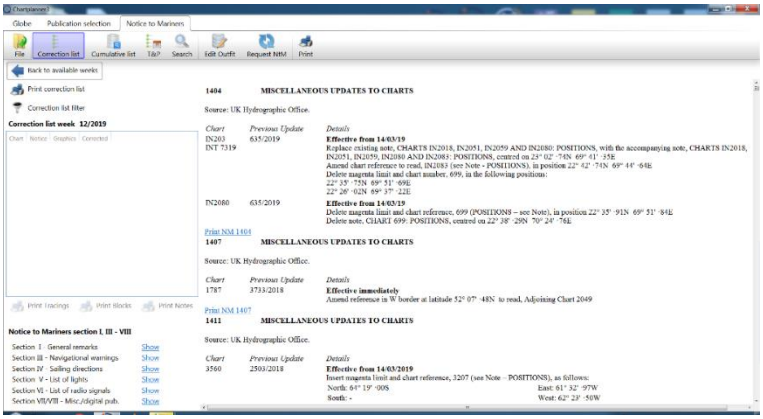
CHART UPDATE AND CORRECTION

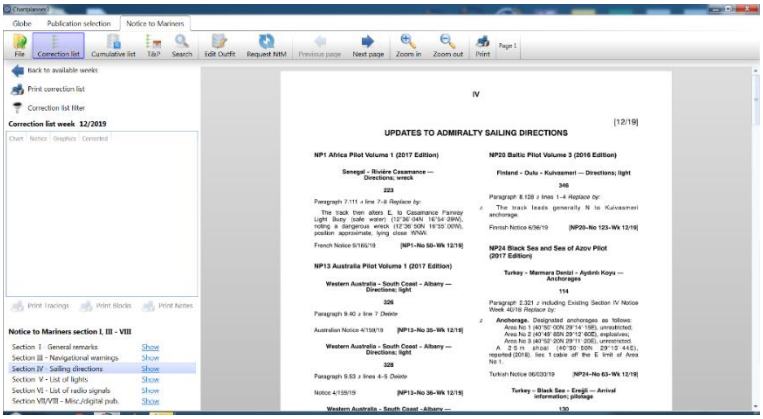
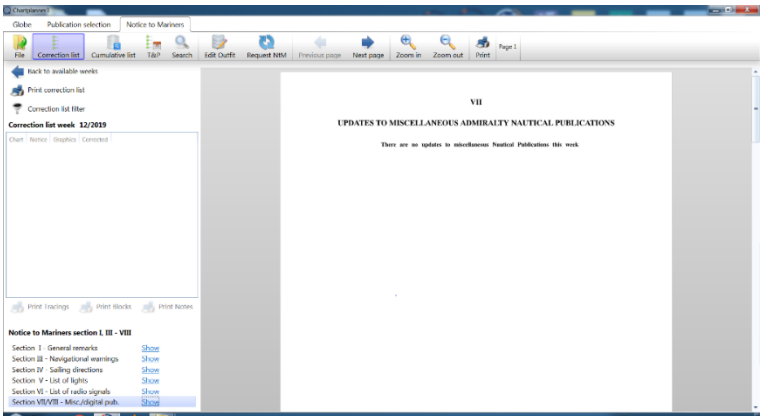
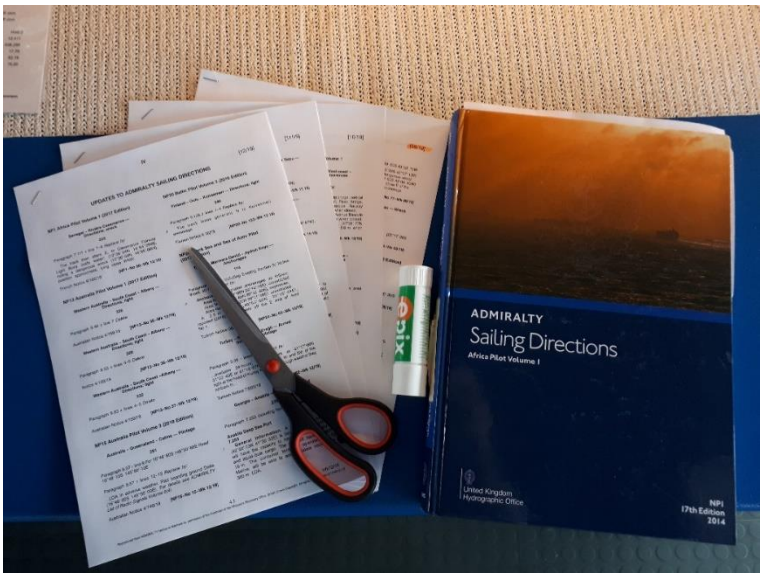
Operating	Description
Chart Maintenance	Press the Tree button, and then press the Chart Maintenance button. As a result, the world chart appears together with the menu Utilities > Chart Maintenance and the selection menu. 
Transferring and Updating the Charts or Cell Files	Transfer function: This is started with the Transfer button of the menu Utilities > Chart Maintenance. It can be used for all chart types to perform the following tasks: - Transfer data of all files, or of selected files, from the CD-ROM, USB-Disk(s) or Floppy to one, several or all databases of the system. - Also, to copy all, or selected, files from the local database to one, several or all other databases of the system. If there are files, will be overwritten on the CHARTPILOT, a safeguard question appears. Update function: This is started with the Update button of the menu Utilities > Chart Maintenance. If there are files, which will be overwritten on the CHARTPILOT, a safeguard question appears. It is used for licensed ENC cells, for ARCS charts and for CM-93/3 Pro cells. In one working step, this function is used for the following purposes with the CD-ROM/USB-Disk(s) on one, several or all databases of the system: - New additional files are transferred. - Where necessary, files are updated. - Outdated files that are no longer supported are deleted (for ENC cells and ARCS charts after a safeguard question).

Data Maintenance of the ENC	Updating of Licensed Cells: Regular update: As soon as a new CD has been received, perform an update on all ENC databases of the system in one working step, using the Update function.
Permits for Licensed ENC cells	Initial Installation of IHO ENC 1. Before initial installation can take place, a subscription must be taken out with a provider. Here the system identification code is needed, and the ENC cells to be used must be determined. For IHO ENC, the system identification code is called the User Permit Number and is displayed when, in the menu Utilities > Chart Maintenance > ENC Licensing, the button View User Permit No. is pressed. The information on the available ENC cells can be obtained in various ways, e.g. through the provider, or through the internet. If having an ENC CD from the provider: The product list located on the CD details all the ENC cells available from the publisher of the CD at the time it was made. If the provider needs other data about the system, further relevant data can be generated as an ECDIS Passport and sent to the provider. 2. Then receiving - The permit file, in which all ENC cell permits acquired are present (per ENC permit Floppy, USB-Disk(s)/media or per e-mail), - The current (IHO) ENC Base CDs, - If applicable, the current (IHO) ENC Update CD. 3. Installing ENC cell permits: Put the ENC permits Floppy Disk into the Floppy or the media in the USB-Disk(s), and in the menu Utilities > Chart Maintenance > ENC Licensing press the button Install Permits from Device. A Device Selection dialog box opens. Select the Floppy, CD/DVD drive or the USB-Disk(s), copy the permit file containing the permits from the Floppy, CD/DVD or USB-Disk(s) into the local ENC database. These processes can be observed in a dialog box. The question Transferring permits to all other systems? should be answered with OK. After the corresponding request, close the dialog box with Cancel. 

NAUTICAL PUBLICATION CORRECTION

Step	Explanation
1	Use Chartplanner3 to receive necessary correction for paper publications, i.e weekly NTM.
2	Open the program. Choose “Notice to Mariners”.
3	On the tab “Notice to Marines”, check to latest weekly update.

4	If there is no required weekly update, click “File” to open from the computer. 
5	Open the file location and choose the required file to open. 
6	The first page of NTM is opened, which has many sections I, III – VIII. 

7	Choose “Section IV – Sailing directions” for updates to ADMIRALTY Sailing Directions. 
8	Choose “Section VII/VIII – Misc./digital pub.” For updates to Miscellaneous ADMIRALTY Nautical Publications. 
9	Print out and insert/ replace/ delete/ correct according to the instructions. 

1.8 TIDES AND CURRENTS

Расчет времени и высот полных, малых и промежуточных вод по отечественным и зарубежным таблицам приливов

TIDE LEVELS

Tide	**Time**	**Height**
HW_1	$T_{HW1} = hh{:}mm$	$h_{HW1} = ##.\#\ m$
LW_1	$T_{LW1} = hh{:}mm$	$h_{LW1} = ##.\#\ m$
HW_2	$T_{HW2} = hh{:}mm$	$h_{HW2} = ##.\#\ m$
LW_2	$T_{LW2} = hh{:}mm$	$h_{LW2} = ##.\#\ m$

Duration of Rise or Fall	$t_{Rise} = T_{HW} - T_{LW}$ $t_{Fall} = T_{LW} - T_{HW}$
Range of the Tide	$R = h_{HW} - h_{LW}$
Present level (at T_i)	$h_{present} = CD + h_i$
Depth of water over the rock	$h = h_i - h_{drying}$
Required depth Required height of Tide	$h_{required} = CD + h_i = T_{draft} + UKC$ $h_i = T_{draft} + UKC - CD$

TIDAL STREAMS AND CURRENTS

Tidal streams	**Currents**
Tidal streams are astronomical in origin.	Currents are not dependent on astronomical conditions and are mainly of meteorological origin.
Tidal streams can be predicted for any period in the future.	Currents caused by temporary meteorological conditions can only be assessed approximately when these conditions are known.

GRAPH OF TIDE

NEW ORLEANS	Time	HW/LW	Height (m)
27.04.2018	06:59	LW	0.0
	19:33	HW	0.2
28.04.2018	07:29	LW	0.1
	21:15	HW	0.2

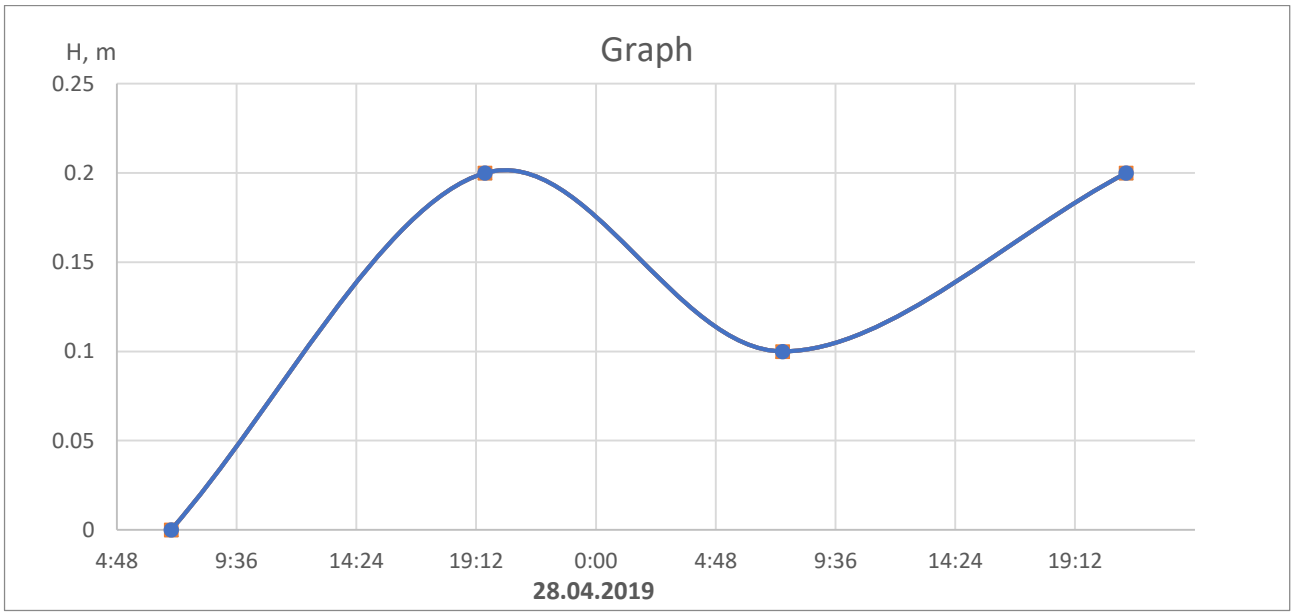


Figure 1.8.1. Graph of tide [1.8]

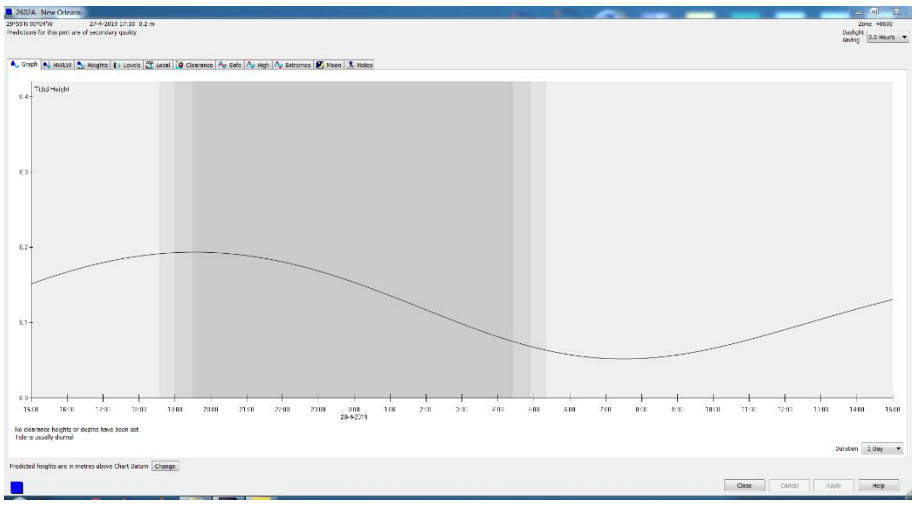
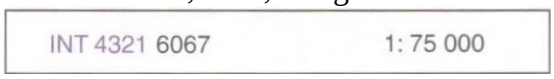
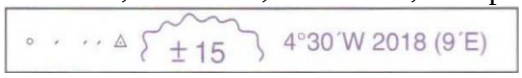
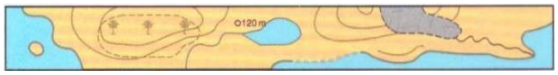


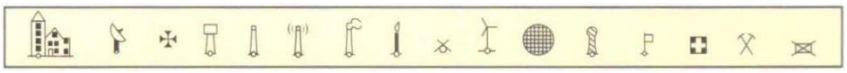
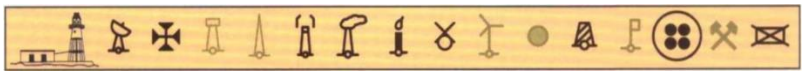
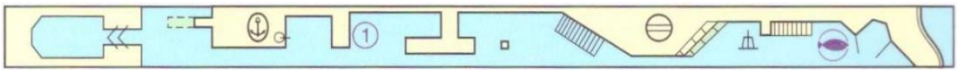
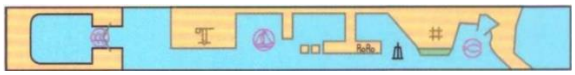
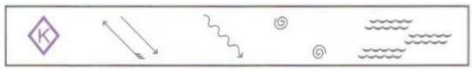
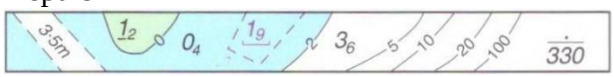
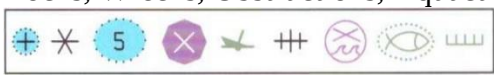
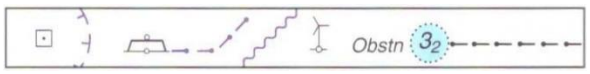
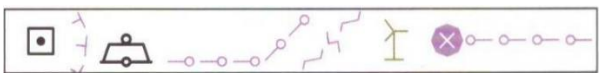
Figure 1.8.2. Graph of tide – ATT [1.8]

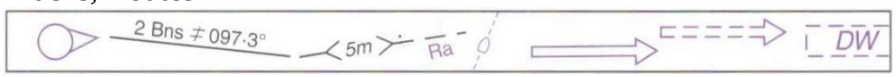
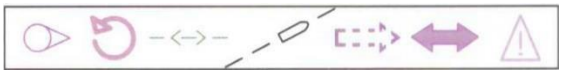
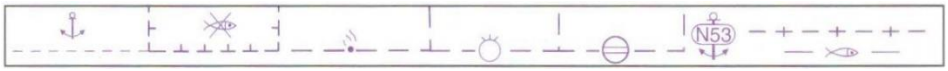
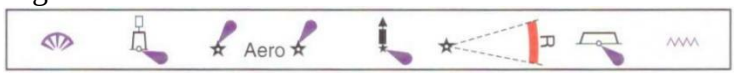
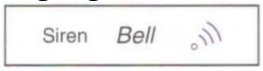
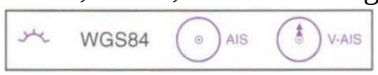
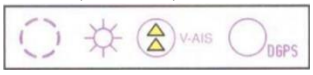
1.9 SYMBOLS AND ABBREVIATIONS USED ON ADMIRALTY CHARTS AND ENCs. THE IALA MARITIME BUOYAGE SYSTEM.

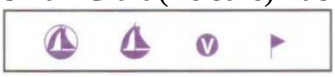
Условные обозначения на морских навигационных картах. Средства навигационного оборудования морей. Знаки МАМС в полном объёме.

OVERVIEW

Category	Contents key	Symbols and Abbreviations Used on ADMIRALTY Charts NP5011 ADMIRALTY Guide to ENC Symbols used in ECDIS NP5012
General	**A**	Chart Number, Title, Marginal Notes 
		Mariner's Navigational Objects
	B	Positions, Distances, Directions, Compass 
		Positions, Distances, Compass
Topography	**C**	Natural Features
		Natural Features 
	D	Cultural Features
		Cultural Features

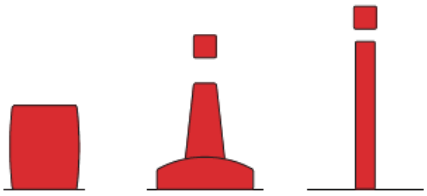
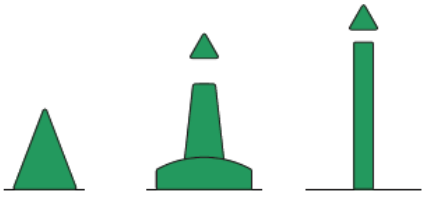
	E	Landmarks 
		Landmarks 
	F	Ports 
		Ports 
Hydrography	H	Tides, Currents 
		Tides, Currents
	I	Depths 
		Depths
	J	Nature of the Seabed
		Nature of the Seabed
	K	Rocks, Wrecks, Obstructions, Aquaculture
		Rocks, Wrecks, Obstructions, Aquaculture 
	L	Offshore Installations 
		Offshore Installations 

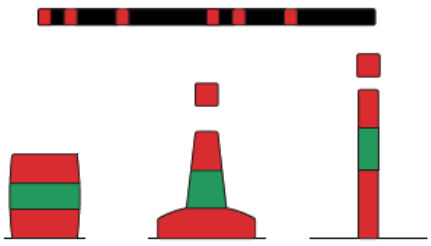
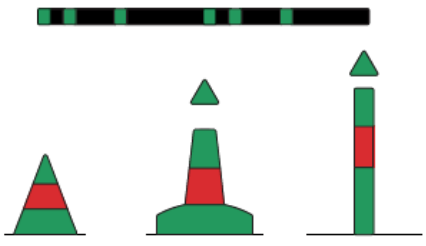
	M	Tracks, Routes 
		Tracks, Routes 
	N	Areas, Limits 
		Areas, Limits
Navigation aids and services	P	Lights 
		Lights
	Q	Buoys, Beacons
		Buoys, Beacons
	R	Fog Signals 
		Fog Signals
	S	Radar, Radio, Satellite Navigation Systems 
		Radar, Radio, Satellite Navigation Systems 
	T	Services
		Services

	U	Small Craft (Leisure) Facilities 
	V	Data Quality Indicators

THE IALA MARITIME BUOYAGE SYSTEM

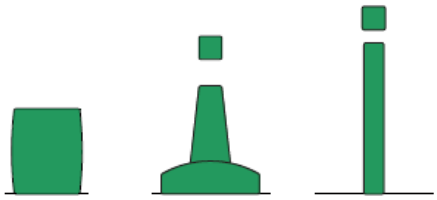
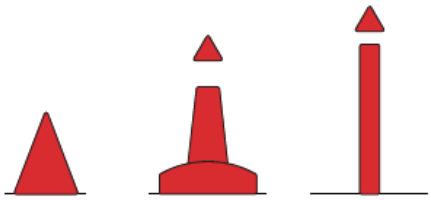
LATERAL MARKS (Region A)

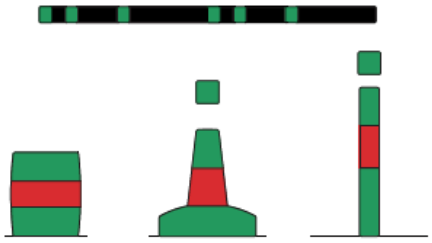
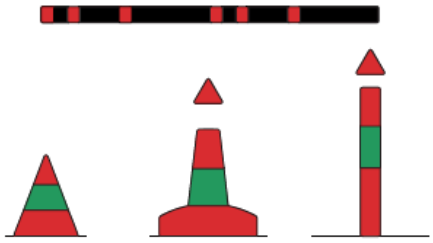
Definition	Lateral marks, used in conjunction with a "conventional direction of buoyage", generally employed for well-defined channels. These marks indicate the port and starboard sides of the route to be followed. Where a channel divides, a modified lateral mark may be used to indicate the preferred route. Lateral marks differ between Buoyage Regions A and B as described in MBS Sections 2 and 8.	
Description		
Mark	**Port hand**	**Starboard hand**
Colour	Red	Green
Shape of buoy	Cylindrical (can), pillar or spar	Conical, pillar or spar
Top-mark (if any)	Single red cylinder (can)	Single green cone, point upward
Light (when fitted)		
Colour	Red	Green
Rhythm	Any, other than that described in "Preferred channels". Continuous-quick light – Q.R Single-flashing light – Fl.R Long-flashing light – LFl.R Group-flashing light – Fl(2).R	Any, other than that described in "Preferred channels". Continuous-quick light – Q.G Single-flashing light – Fl.G Long-flashing light – LFl.G Group-flashing light – Fl(2).G

Definition	At the point where a channel divides, when proceeding in the "conventional direction of buoyage", a preferred channel may be indicated by a modified Port or Starboard lateral mark.	
Description		
Mark	**Preferred channel to Starboard**	**Preferred channel to Port**

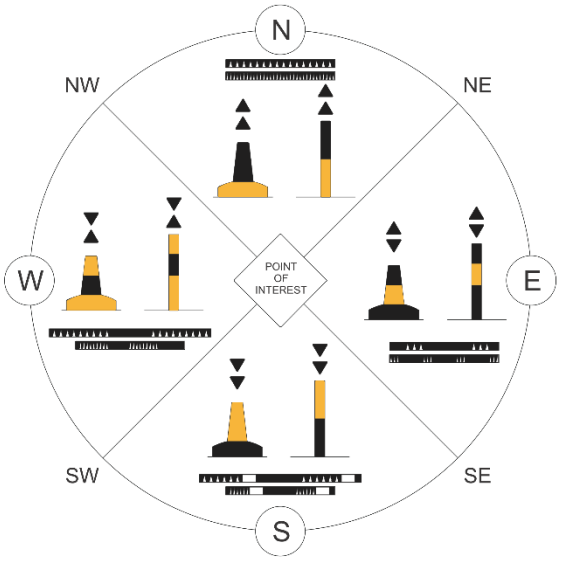
Colour	Red with one broad green horizontal band	Green with one broad red horizontal band
Shape of buoy	Cylindrical (can), pillar or spar	Conical, pillar or spar
Top-mark (if any)	Single red cylinder (can)	Single green cone, point upward
Light (when fitted)		
Colour	Red	Green
Rhythm	Composite group flashing (2 + 1) Fl(2+1).R	Composite group flashing (2 + 1) Fl(2+1).G

LATERAL MARKS (Region B)

Definition	Lateral marks, used in conjunction with a "conventional direction of buoyage", generally employed for well-defined channels. These marks indicate the port and starboard sides of the route to be followed. Where a channel divides, a modified lateral mark may be used to indicate the preferred route. Lateral marks differ between Buoyage Regions A and B as described in MBS Sections 2 and 8.	
Description		
Mark	**Port hand**	**Starboard hand**
Colour	Green	Red
Shape of buoy	Cylindrical (can), pillar or spar	Conical, pillar or spar
Top-mark (if any)	Single green cylinder (can)	Single red cone, point upward
Light (when fitted)		
Colour	Green	Red
Rhythm	Any, other than that described in "Preferred channels". Continuous-quick light – Q.G Single-flashing light – Fl.G Long-flashing light – LFl.G Group-flashing light – Fl(2).G	Any, other than that described in "Preferred channels". Continuous-quick light – Q.R Single-flashing light – Fl.R Long-flashing light – LFl.R Group-flashing light – Fl(2).R

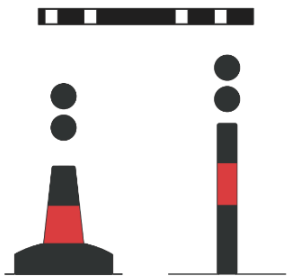
Definition	At the point where a channel divides, when proceeding in the "conventional direction of buoyage", a preferred channel may be indicated by a modified Port or Starboard lateral mark.	
Description		
Mark	**Preferred channel to Starboard**	**Preferred channel to Port**
Colour	Green with one broad red horizontal band	Red with one broad green horizontal band
Shape of buoy	Cylindrical (can), pillar or spar	Conical, pillar or spar
Top-mark (if any)	Single green cylinder (can)	Single red cone, point upward
Light (when fitted)		
Colour	Green	Red
Rhythm	Composite group flashing (2 + 1) Fl(2+1).G	Composite group flashing (2 + 1) Fl(2+1).R

CARDINAL MARKS

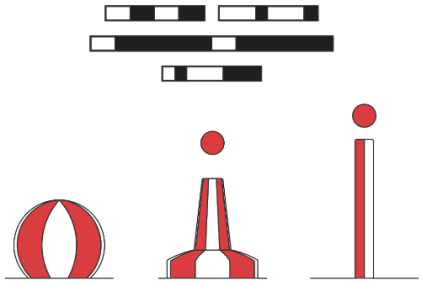
Definition	The four quadrants (North, East, South and West) are bounded by the true bearings NW-NE, NE-SE, SE-SW, and SW-NW, taken from the point of interest. A Cardinal mark is named after the quadrant in which it is placed. The name of a Cardinal mark indicates that it should be passed to the named side of the mark. The Cardinal marks in Region A and Region B, and their use, are the same.
Description	

Mark	**North Cardinal Mark**	**East Cardinal Mark**	**South Cardinal Mark**	**West Cardinal Mark**
Colour	Black above yellow	Black with a single broad horizontal yellow band	Yellow above black	Yellow with a single broad horizontal black band
Shape of buoy	Pillar or spar	Pillar or spar	Pillar or spar	Pillar or spar
Top-mark (if any)	2 black cones, one above the other	2 black cones, one above the other, points upward base to base	2 black cones, one above the other, points downward	2 black cones, one above the other, point to point
Light (when fitted)				
Colour	White	White	White	White
Rhythm	VQ or Q	VQ(3) every 5 s or Q(3) every 10 s	VQ(6) + Long flash every 10 s or Q(6) + Long flash every 15 s	VQ(9) every 10 s or Q(9) every 15 s

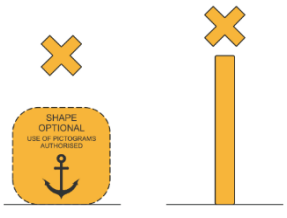
ISOLATED DANGER MARKS

Definition	An isolated Danger mark is a mark erected on, or moored on or above, an isolated danger which has navigable water all around it.
Description	
Colour	Black with one or more broad horizontal red bands
Shape of buoy	Optional, but not conflicting of buoy with lateral marks; pillar or spar preferred
Top-mark (if any)	Two black spheres, one above the other
Light (when fitted)	
Colour	White
Rhythm	Group flashing (2)

SAFE WATER MARKS

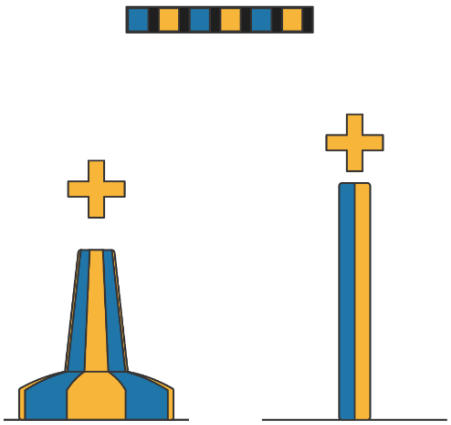
Definition	Safe Water marks serve to indicate that there is navigable water all-round the mark. These include centre line marks and mid-channel marks. Such a mark may also be used to indicate channel entrance, port or estuary approach, or landfall. The light rhythm may also be used to indicate best point of passage under bridges.
Description	
Colour	Red and white vertical stripes
Shape of buoy	Spherical; pillar or spar with spherical top-mark
Top-mark (if any)	Single red sphere
Light (when fitted)	
Colour	White
Rhythm	Isophase, occulting, one long flash every 10 s or Morse “A”

SPECIAL MARKS

Definition	Marks used to indicate a special area or feature whose nature may be apparent from reference to a chart or other nautical publication. They are not generally intended to mark channels or obstructions where other marks are more suitable. Some examples of uses of Special Marks 1. Ocean Data Acquisition Systems (ODAS) marks. 2. Traffic separation marks where use of conventional channel marking may cause confusion. 3. Spoil Ground marks. 4. Military exercise zone marks. 5. Cable or pipeline marks. 6. Recreation zone marks. 7. Boundaries of anchorage areas 8. Structures such as offshore renewable energy installations 9. Aquaculture
Description	

Colour	Yellow
Shape of buoy	Optional, but not conflicting with lateral marks
Top-mark (if any)	Single yellow "X" shape
Light (when fitted)	
Colour	Yellow
Rhythm	Any, other than those reserved for cardinal, isolated danger and safe water marks.
Pictogram	The use of pictograms is authorized, as defined by a competent authority.

MARKING NEW DANGERS

Definition	The term "New Danger" is used to describe newly discovered hazards not yet shown in nautical documents. "New Dangers" include naturally occurring obstructions such as sandbanks or rocks or man-made dangers such as wrecks.
Description	
Colour	Blue/Yellow vertical stripes in equal number dimensions (minimum 4 stripes and maximum 8)
Shape of buoy	Pillar or spar
Top-mark (if any)	Vertical/perpendicular yellow cross
Light (when fitted)	
Colour	Yellow/blue alternating
Rhythm	One second of blue light and one second of yellow light with 0.5 s of darkness between

1.10 ECDIS

Использование электронных карт

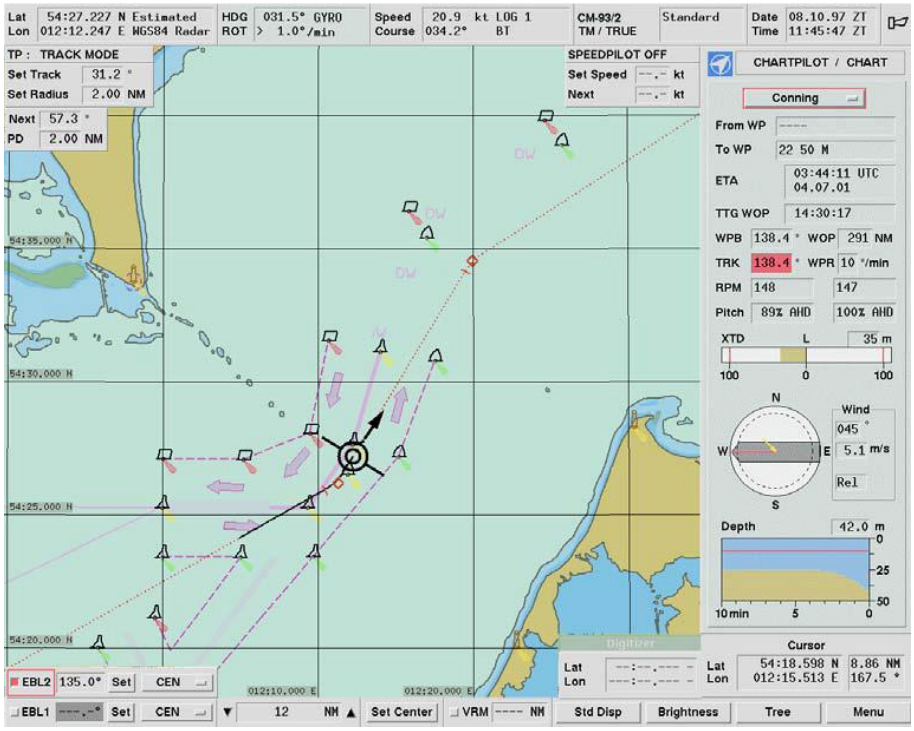
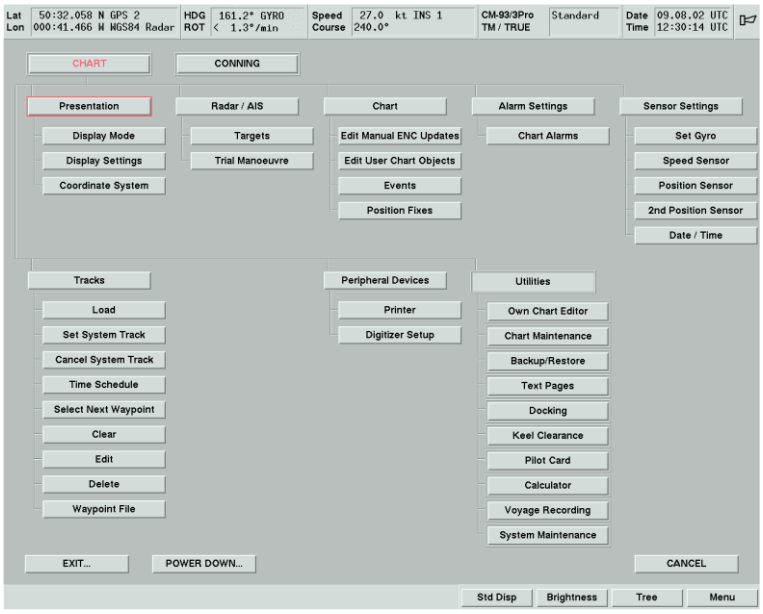
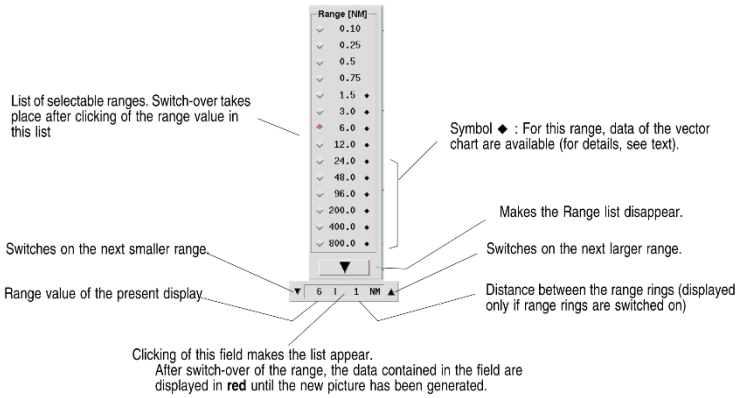
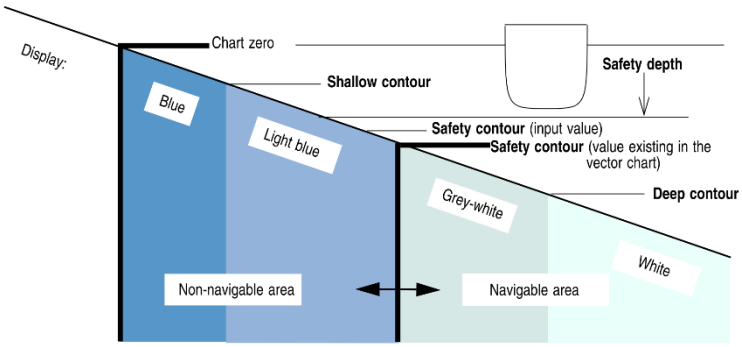
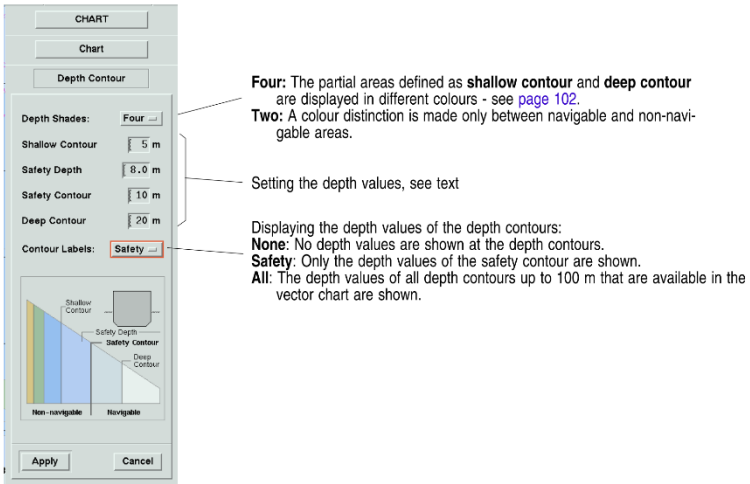
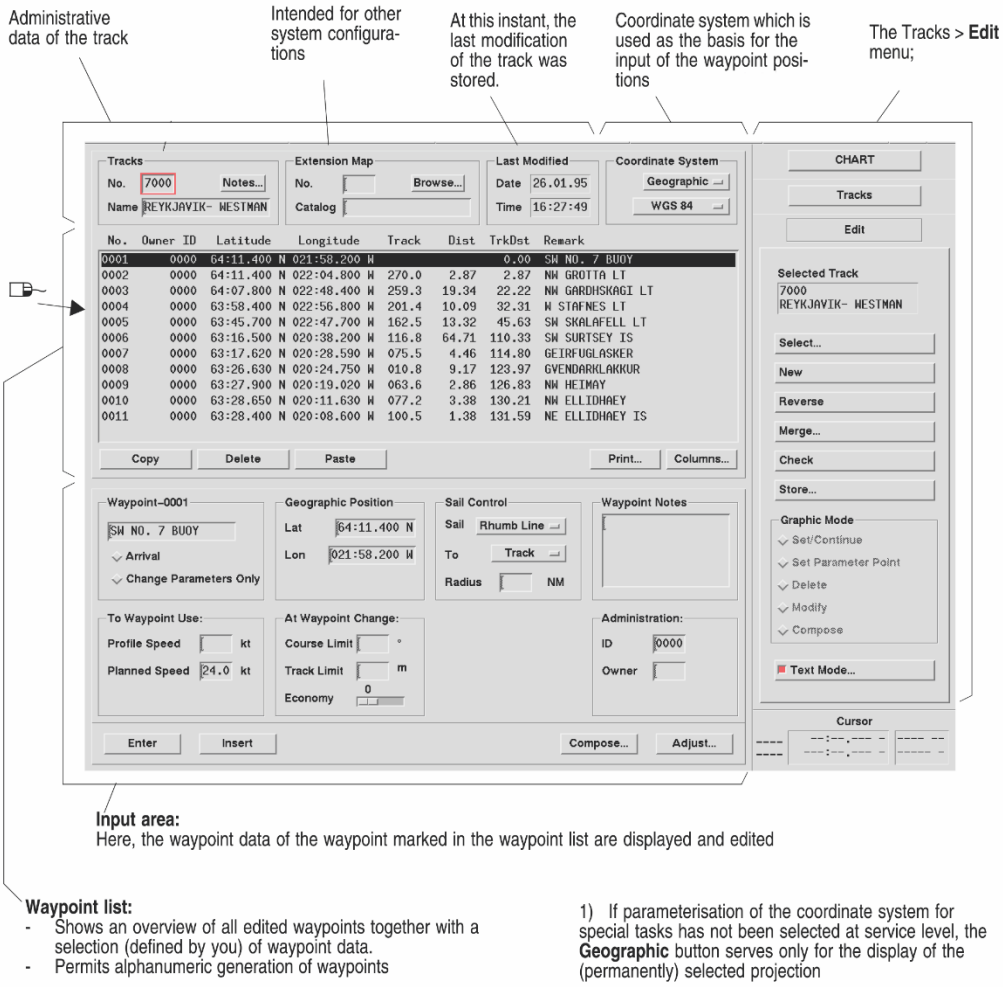


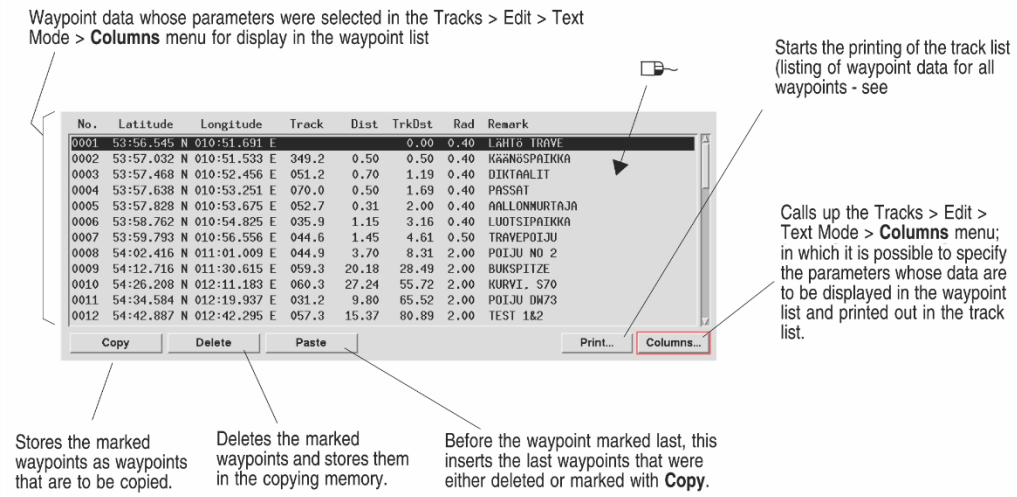
Figure 1.10.1. CHARTPILOT 1100 [1.10]

Operating/ Setting	Description
The Function Overview (Tree)	

	Switching the Tree On This is done by pressing the Tree button. Switching Off the Tree The display of the tree can be switched off by pressing the CANCEL button (without switch-over of menu or mode).
Adjusting the Range	The size of the geographical excerpt displayed can be changed by operating the Range field. 
The depth contour system	
Defining the Depth Contours to be Displayed	Inputting the Safety Depth, Safety Contour and Other Depth Contours 

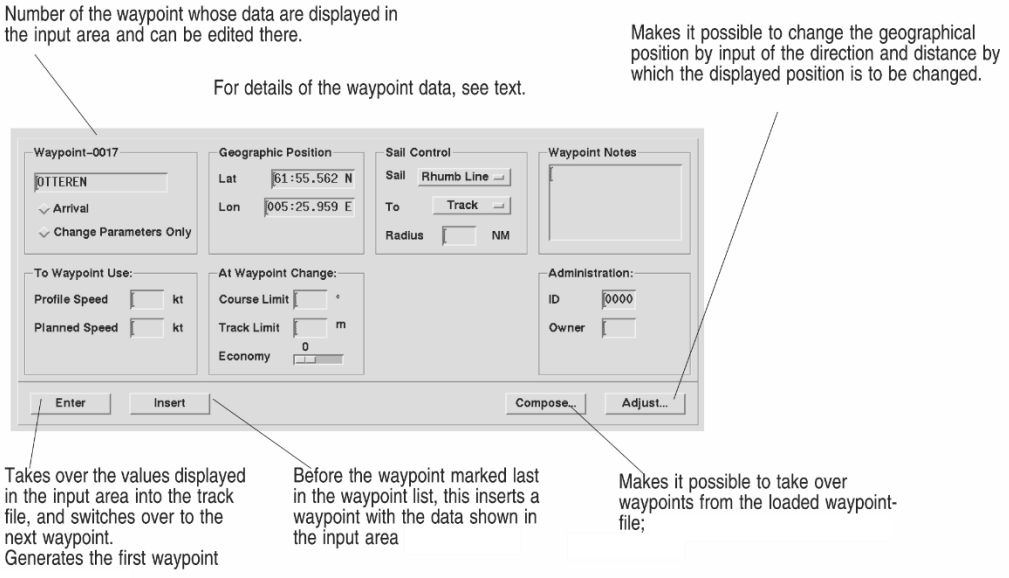
	1. In the Chart > Depth Contour menu, input the safety depth (draught plus a reserve of 2 m, for example). 2. Input the safety contour (value greater than the safety depth). 3. By input of shallow contour (value between 0 and the safety contour), the non-navigable area can be divided into two areas having different depth ranges. By input of deep contour (value greater than the safety contour), the navigable area can be divided into two areas having different depth ranges.
Voyage Planning	Generation of Pre-planned Tracks  The Work Steps for Generating a Track The generating of tracks is mainly divided into the following steps (the same applies to the modifying of existing tracks): - Preparing the generation of the track - Setting the digitizer up, if it is to be used - Generation of waypoints - Editing of waypoint data - Checking the track - Completing the generation of the track

Configuring the Waypoint List	In the waypoint list, all waypoints generated are listed. In this list, not only the waypoint number but also all waypoint data can be displayed, but not all at the same time. It is therefore necessary to define which data are to be displayed.



No.	Latitude	Longitude	Track	Dist	TrkDst	Rad	Remark
0001	53:56.545 N	010:51.691 E			0.00	0.40	LÄHTÖ TRAVE
0002	53:57.032 N	010:51.533 E	349.2	0.50	0.50	0.40	KÄÄNNÖSPAIKKA
0003	53:57.468 N	010:52.456 E	051.2	0.70	1.19	0.40	DIKTAALIT
0004	53:57.638 N	010:53.251 E	070.0	0.50	1.69	0.40	PASSAT
0005	53:57.828 N	010:53.675 E	052.7	0.31	2.00	0.40	AALLONMURTAJA
0006	53:58.762 N	010:54.825 E	035.9	1.15	3.16	0.40	LUOTSIPAIKKA
0007	53:59.793 N	010:56.556 E	044.6	1.45	4.61	0.50	TRAVEPOIJU
0008	54:02.416 N	011:01.009 E	044.9	3.70	8.31	2.00	POIJU NO 2
0009	54:12.716 N	011:30.615 E	059.3	20.18	28.49	2.00	BUKSPITZE
0010	54:26.208 N	012:11.183 E	060.3	27.24	55.72	2.00	KURVI, S70
0011	54:34.584 N	012:19.937 E	031.2	9.80	65.52	2.00	POIJU DW73
0012	54:42.887 N	012:42.295 E	057.3	15.37	80.89	2.00	TEST 1&2

The input area in the Text Mode menu



1.11 VOYAGE PLANNING. APPRAISAL.

Подбор карт и пособий на переход. Подъём карты и выполнение предварительной прокладки с учётом навигационных опасностей, течений.

IMO RESOLUTION A.893(21) – GUIDELINES FOR VOYAGE PLANNING

2 Appraisal

2.1 All information relevant to the contemplated voyage or passage should be considered. The following items should be taken into account in voyage and passage planning:
[Listing]

2.2 On the basis of the above information, an overall appraisal of the intended voyage or passage should be made. This appraisal should provide a clear indication of all areas of danger; those areas where it will be possible to navigate safely, including any existing routeing or reporting systems and vessel traffic services; and any areas where marine environmental protection considerations apply.

APPRAISAL

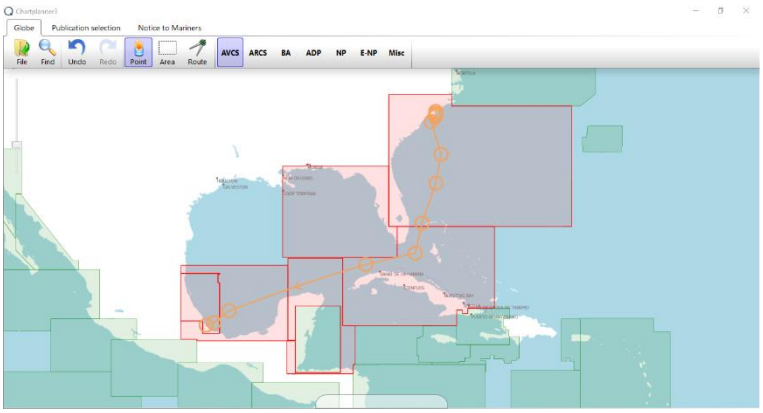
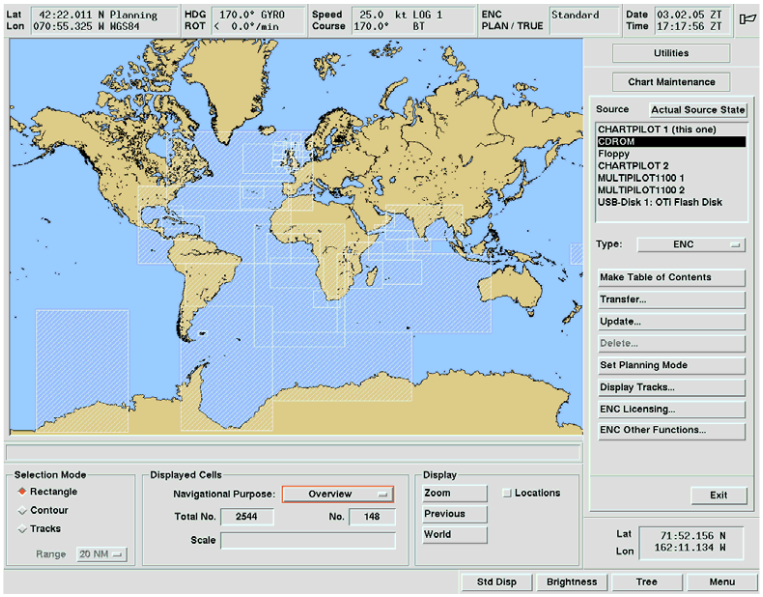
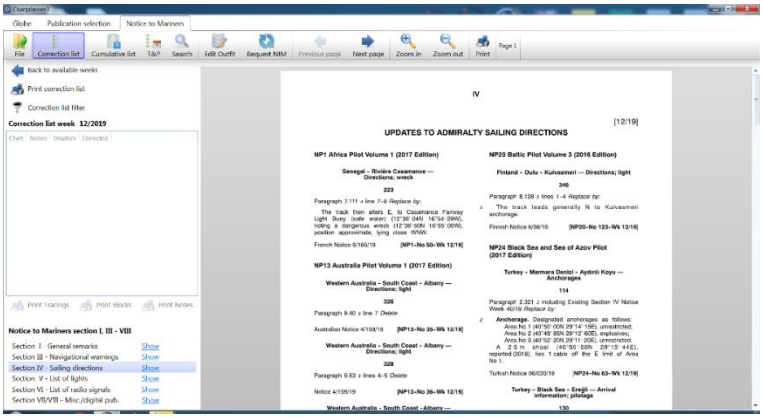
<table>
<tr><th>Step</th><th>Description</th><th>Remark</th></tr>
<tr><td>1</td><td>Chartering, voyage and cargo information

For example:

<table>
<tr><th>Charterer</th><th>Voyage</th><th>Cargo</th></tr>
<tr><td>Hugo Stinnes</td><td>Dunkirk – Antwerp – Bremen – Wilmington, NC – Veracruz – Altamira</td><td>Project cargoes, Steel coils, Containers</td></tr>
</table>

Planning a voyage from Wilmington, North Carolina (USA) to Veracruz (Mexico)</td><td></td></tr>
<tr><td>2</td><td>Chart and publication collection

Using Chartplanner3 for chart and publication collection.</td><td></td></tr>
</table>

		
3	**Chart update and correction** Using Chart Maintenance function in CHARTPILOT for chart update and correction. 	
4	**Publication update and correction** Using Chartplanner3 and ADP Date Updating Wizard for publication update and correeection. 	

Data Updating Wizard - Welcome
Print an Update Certificate suitable for presentation to Port State Authorities
Preview
Print
Welcome to the ADP Data Updating Wizard.
You can use this tool to obtain and apply the latest update files for ADMIRALTY Digital List of Lights (ADLL), ADMIRALTY Digital Radio Signals (ADRS), and ADMIRALTY TotalTide (ATT).
Obtain updates direct from the ADMIRALTY web service
Apply updates you've already downloaded or received via e-mail, FTP or the Weekly Update DVD
Data gathering options
Automatically display the update wizard from ADP
Press 'Next' to continue.
< Back
Next >
Cancel

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is licensed for use until woensdag 31 juli 2019
ADLL Areas 1 & 2, 4 and 9 Updated to Week 18/19
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ADRS1345 Area 1 and 2 Updated to Week 18/19
ADRS6 Areas 1 & 2, 3, 4 and 9 Updated to Week 18/19
ATT Areas 1-4 and 9 Updated to Week 18/19
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ATT, ADLL, ADRS 1,3,4,5, ADRS 2 and ADRS 6 have been accepted by UK Maritime and Coastguard Agency as meeting the SOLAS carriage requirement for nautical publications. Flag State approvals can be viewed at admiralty.co.uk/fl ag-state-approval
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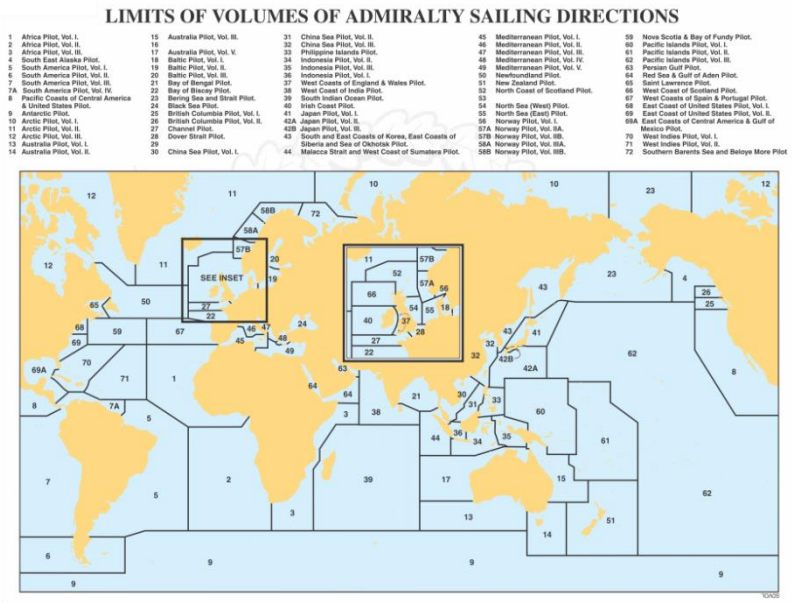
1.12 VOYAGE PLANNING. PLANNING, EXECUTION AND MONITORING.

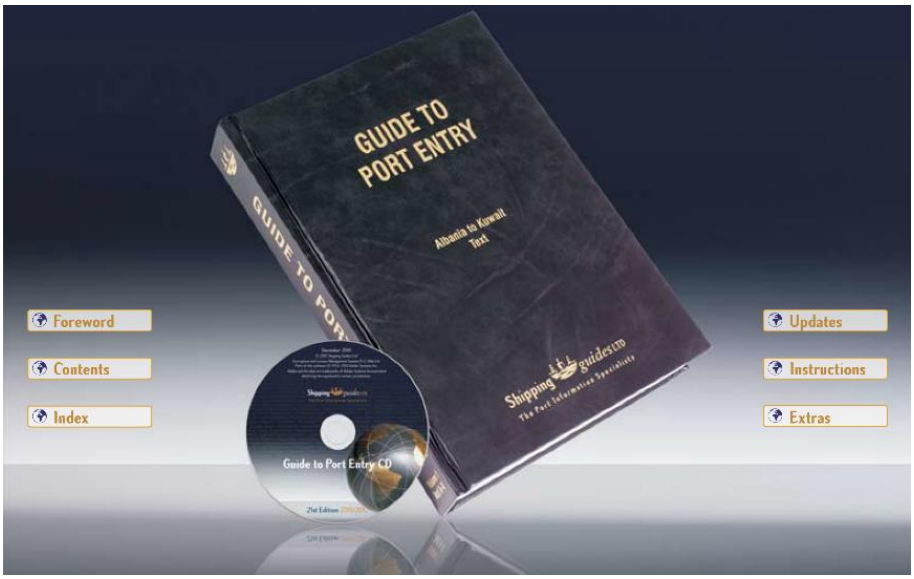
Планирование рейса и судовождения в любых условиях. Учёт течений и погодных условий. Участие в обсуждении плана перехода со штурманским составом.

IMO RESOLUTION A.893(21) – GUIDELINES FOR VOYAGE PLANNING

3	***Planning***
3.1	On the basis of the fullest possible appraisal, a detailed voyage or passage plan should be prepared which should cover the entire voyage or passage from berth to berth, including those areas where the services of a pilot will be used.
3.2	The detailed voyage or passage plan should include the following factors: [Listing]
3.3	The details of the voyage or passage plan should be clearly marked and recorded, as appropriate, on charts and in a voyage plan notebook or computer disk.
3.4	Each voyage or passage plan as well as the details of the plan, should be approved by the ships' master prior to the commencement of the voyage or passage.
4	***Execution***
4.1	Having finalized the voyage or passage plan, as soon as time of departure and estimated time of arrival can be determined with reasonable accuracy, the voyage or passage should be executed in accordance with the plan or any changes made thereto.
4.2	Factors which should be taken into account when executing the plan, or deciding on any departure therefrom include: [Listing]
4.3	It is important for the master to consider whether any particular circumstance, such as the forecast of restricted visibility in an area where position fixing by visual means at a critical point is an essential feature of the voyage or passage plan, introduces an unacceptable hazard to the safe conduct of the passage; and thus whether that section of the passage should be attempted under the conditions prevailing or likely to prevail. The master should also consider at which specific points of the voyage or passage there may be a need to utilize additional deck or engine room personnel.
5	***Monitoring***
5.1	The plan should be available at all times on the bridge to allow officers of the navigational watch immediate access and reference to the details of the plan.
5.2	The progress of the vessel in accordance with the voyage and passage plan should be closely and continuously monitored. Any changes made to the plan should be made consistent with these Guidelines and clearly marked and recorded.

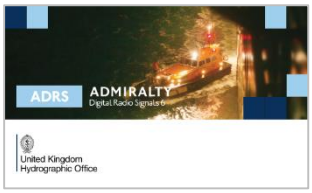
PLANNING, EXECUTION AND MONITORING

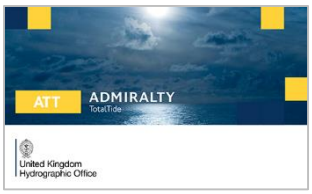
Step	Description	Remark
1	**Ocean passages for the world** Using ADMIRALTY Ocean Passage for The World to find the recommended route from port A to port B. Alternative method: Using SPOS. 	
2	**Sailing directions** Collecting all the necessary information of the port of departure, the passage and the port of arrival, as well as meteorological information. 	
3	**Guide to port entry** Referring to Guide to Port Entry for additional information.	

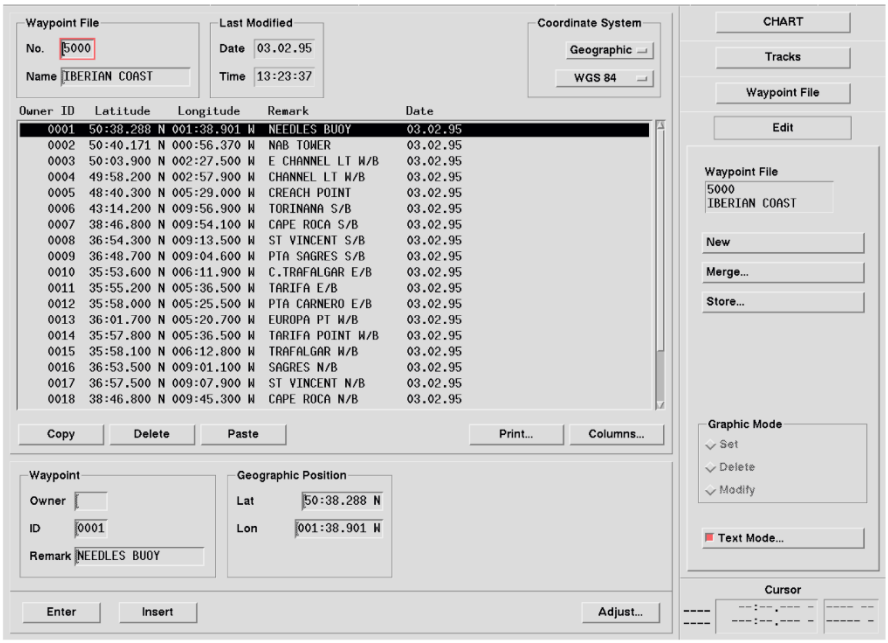
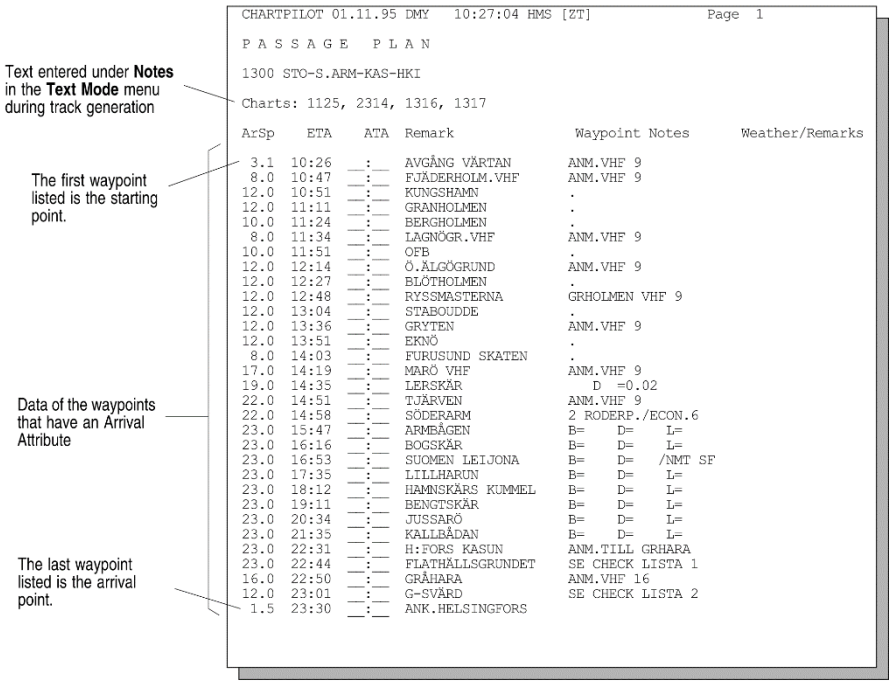


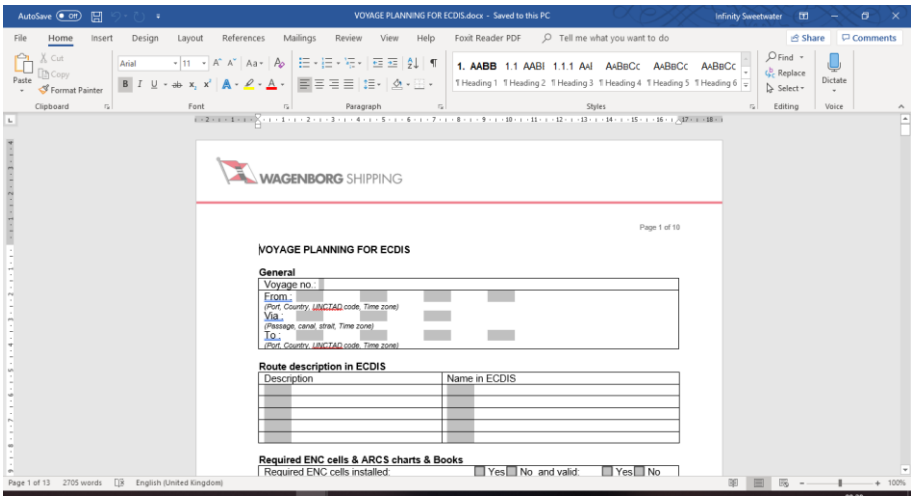
4 **ADP**

Using ADLL, ADRS 2, ADRS 1,3,4,5, ADRS 6 and ATT for all relevant information concerning lights, aids to navigation, meteorology, port, pilotage, VTS, TSS and reporting systems, etc.





5	**Planning the voyage on ECDIS**  	
6	**Waypoint list** Printing out the waypoint list (i.e. passage plan) as soon as the planning stage is finished and checked.  	
7	**“Voyage planning for ECDIS” form** Filling the form “Voyage planning for ECDIS”, which can be downloaded from WALFIS.	

		
8	**Execution** Defining the System Track on the CHARTPILOT 1. The pre-planned track must be loaded: In the Tracks > Load menu, under Catalogs click the catalog to which the track is assigned, under Tracks click the track that is to be loaded, and exit the menu by pressing the OK button. 2. Under Loaded Tracks in the Tracks > Set System Track menu, mark the track that is to be defined as the System Track, and exit the menu by pressing the OK button.	
9	**Monitoring** Closely and continuously monitoring.	

Reference: An example of the Voyage Plan: Wilmington, North Carolina (USA) – Veracruz (Mexico)

WAYPOINT LIST: WILMINGTON, NC – VERACRUZ

MapName	**WilmingNC-Veracruz**	CatalogName	**WORLD**	MapNumber	**9990**

WP No.	Remark	TrkDst	Track	Latitude, Longitude	ETA	Rad	SM	DTG R
1	Wilmington Berth	0		34:12.342 N 077:57.437 W		0.25	RL	1682.9
2	CP Fear Channeling	0.54	175.8	34:11.806 N 077:57.389 W		0.25	RL	1682.4
3	Cp Fear Channeling	1.1	183.5	34:11.240 N 077:57.431 W		0.25	RL	1681.8
4	Cp Fear Channeling	1.96	184.3	34:10.386 N 077:57.509 W		0.25	RL	1681
5	Cp Fear Channeling	2.66	191.5	34:09.699 N 077:57.678 W		0.25	RL	1680.3
6	Cp Fear Channeling	4.01	153.3	34:08.493 N 077:56.944 W		0.25	RL	1678.9
7	Cp Fear Channeling	4.65	136.7	34:08.026 N 077:56.412 W		0.25	RL	1678.3
8	Cp Fear Channeling	5.08	152.9	34:07.643 N 077:56.176 W		0.25	RL	1677.8
9	Cp Fear Channeling	5.29	164.3	34:07.442 N 077:56.107 W		0.25	RL	1677.6
10	Cp Fear Channeling	6.46	183.2	34:06.276 N 077:56.185 W		0.25	RL	1676.5
11	Cp Fear Channeling	8.11	173.2	34:04.641 N 077:55.949 W		0.25	RL	1674.8
12	Cp Fear Channeling	9.88	192.9	34:02.913 N 077:56.428 W		0.25	RL	1673
13	Cp Fear Channeling	12.14	179.3	34:00.651 N 077:56.395 W		0.25	RL	1670.8
14	Cp Fear Channeling	13.55	194.4	33:59.284 N 077:56.818 W		0.25	RL	1669.4
15	Cp Fear Channeling	14.56	184.7	33:58.277 N 077:56.918 W		0.25	RL	1668.4
16	Cp Fear Channeling	15.58	204	33:57.347 N 077:57.417 W		0.25	RL	1667.3
17	Cp Fear Channeling	18.17	225.6	33:55.537 N 077:59.648 W		0.25	RL	1664.8
18	Cp Fear Channeling	19.8	235.1	33:54.606 N 078:01.258 W		0.25	RL	1663.1
19	Cp Fear Channeling	20.22	167.8	33:54.196 N 078:01.151 W		0.25	RL	1662.7
20	Cp Fear Channeling	21.1	140.1	33:53.522 N 078:00.473 W		0.25	RL	1661.9
21	Cp Fear Channeling	21.42	161.9	33:53.213 N 078:00.352 W		0.25	RL	1661.5
22	Cp Fear Channeling	22.07	188.2	33:52.574 N 078:00.463 W		0.25	RL	1660.9
23	Cp Fear Channeling	22.3	206.1	33:52.364 N 078:00.587 W		0.25	RL	1660.7
24	Cp Fear Channeling	23.01	222.5	33:51.845 N 078:01.159 W		0.25	RL	1660
25	Cp Fear Channeling	23.69	206	33:51.232 N 078:01.519 W		0.25	RL	1659.3
26	CF Lt By	28.94	194	33:46.131 N 078:03.045 W		0.25	RL	1654
27	PILOT Off	29.87	253.7	33:45.872 N 078:04.110 W		0.25	RL	1653.1
28	TSS Enter	30.57	257.4	33:45.719 N 078:04.931 W		0.5	RL	1652.4
29	TSS Exit	44.52	218.9	33:34.867 N 078:15.471 W		0.5	RL	1638.5
30	NAECA Exit	251.01	162.8	30:17.600 N 077:03.523 W		0.5	RL	1432
31	Rounding point	377.95	165.9	28:14.496 N 076:28.018 W		0.5	RL	1305.2
32	Florida Strait	531.75	251.7	27:26.176 N 079:13.137 W		0.5	RL	1151.5
33	Florida Strait	674.35	189.4	25:05.482 N 079:39.072 W		0.5	RL	1008.9
34	Florida Strait	698.91	196.3	24:41.911 N 079:46.659 W		0.5	RL	984.4
35	Florida Strait	791.97	237.5	23:51.912 N 081:12.764 W		0.5	RL	891.35
36	WP 36	1173.4	259	22:38.845 N 088:00.299 W		0.5	RL	509.87
37	WP 37	1419.2	253	21:26.931 N 092:13.827 W		0.5	RL	264.13
38	Veracruz TSS Enter	1657.2	236.2	19:14.441 N 095:44.792 W		0.5	RL	26.08
39	Veracruz TSS Exit	1665.8	269.3	19:14.334 N 095:53.868 W		0.5	RL	17.52
40	PILOT STATION	1676.4	235.3	19:08.289 N 096:03.099 W		0.25	RL	7.09
41	WP 41	1679.9	338.2	19:11.476 N 096:04.449 W		0.25	RL	3.84
42	By No. 6-5	1680.8	317.5	19:12.166 N 096:05.118 W		0.25	RL	2.91
43	Fairway By	1681.6	279.7	19:12.295 N 096:05.914 W		0.25	RL	2.15
44	Breakwaters	1682.8	263	19:12.144 N 096:07.216 W		0.25	RL	0.92
45	Inside Port	1683.5	284.3	19:12.311 N 096:07.908 W		0.25	RL	0.25
46	Veracruz Berth	1683.7	328.3	19:12.534 N 096:08.054 W		0.25	RL	0

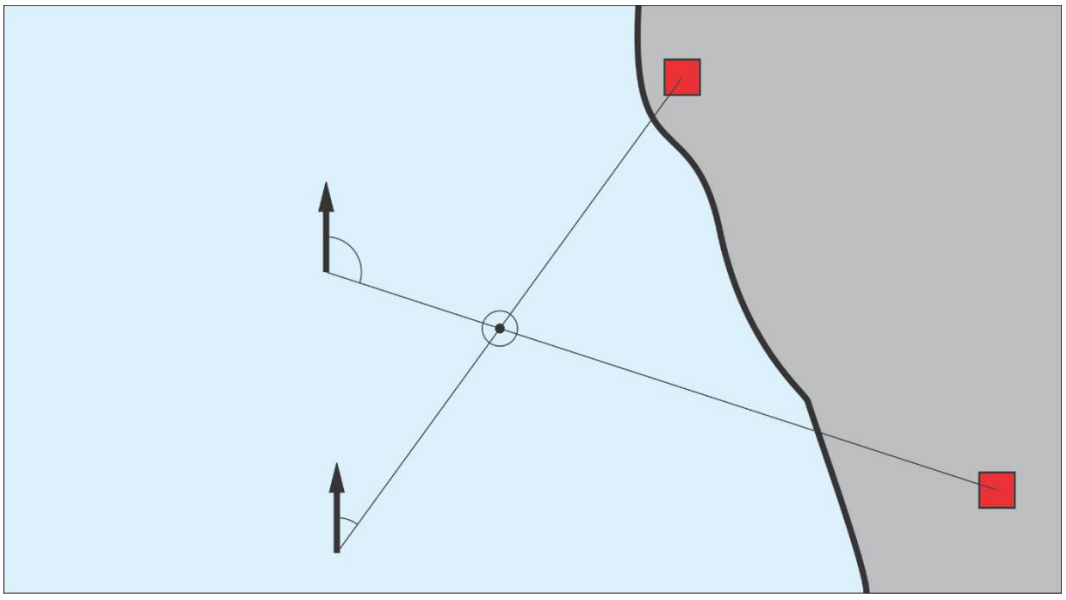
1.13 FIXING THE POSITION

Определение места судна с оценкой точности визуальными способами. Ведение счисления пути судна. Учёт дрейфа и течения при счислении. Ведение аналитического счисления в течение вахты. Определение поправок компаса навигационными способами.

SIMULTANEOUS BEARINGS. 2 BEARINGS.

Date and time	dd.mm.yyyy hh:mm:ss	*GPS position*	$\varphi =$
Course	$CSE =$	*(Reference)*	$\lambda =$
Speed	$SPD =$	*Gyro compass error*	$\Delta GC =$
Landmarks		*Gyro bearing*	*True bearing* $TB_i = GB_i + \Delta GB$
1.		$GB_1 =$	$TB_1 =$
2.		$GB_2 =$	$TB_2 =$
Dead reckoning	$\varphi_{DR} =$	***Observed***	$\varphi_{Obs} =$
	$\lambda_{DR} =$		$\lambda_{Obs} =$
Difference			

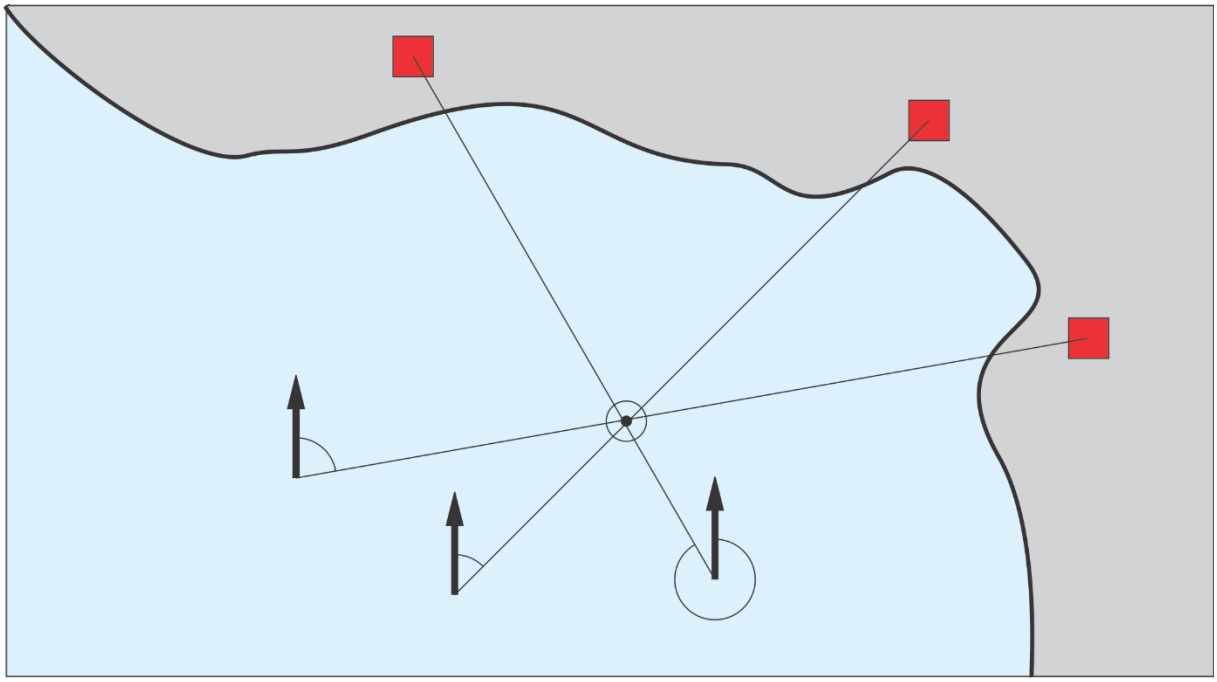
Explanation



SIMULTANEOUS BEARINGS. 3 BEARINGS.

Date and time	dd.mm.yyyy hh:mm:ss	*GPS position*	$\varphi =$
Course	$CSE =$	*(Reference)*	$\lambda =$
Speed	$SPD =$	*Gyro compass error*	$\Delta GC =$
Landmarks		*Gyro bearing*	*True bearing* $TB_i = GB_i + \Delta GB$
1.		$GB_1 =$	$TB_1 =$
2.		$GB_2 =$	$TB_2 =$
3.		$GB_3 =$	$TB_3 =$
Dead reckoning	$\varphi_{DR} =$	***Observed***	$\varphi_{Obs} =$
	$\lambda_{DR} =$		$\lambda_{Obs} =$
Difference			

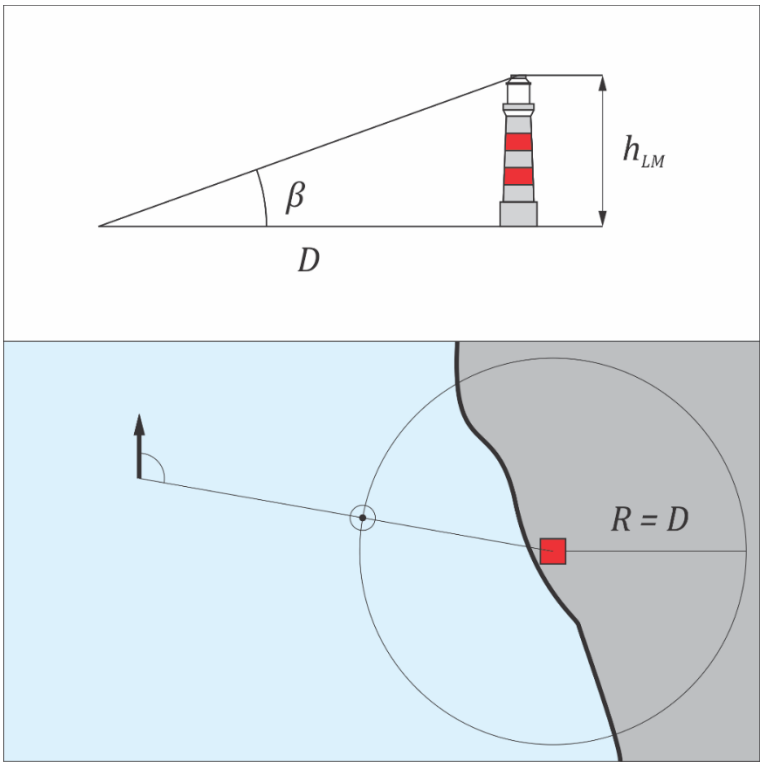
Explanation



SIMULTANEOUS BEARING AND DISTANCE. VERTICAL SEXTANT ANGLE.

Date and time	dd.mm.yyyy hh:mm:ss	*GPS position*	$\varphi =$
Course	$CSE =$	*(Reference)*	$\lambda =$
Speed	$SPD =$	*Gyro compass error*	$\Delta GC =$
Landmarks		*Gyro bearing*	*True bearing* $TB_i = GB_i + \Delta GB$
1.		$GB_1 =$	$TB_1 =$
$h_{LM} =$	$Sextant =$	$(i+S)' =$	$\beta' = Sextant + (i+S)'$ $\beta' =$
$D' = \frac{h_{LM}}{\beta'} \times \frac{2700}{463\pi}$	$D' =$		
Dead reckoning	$\varphi_{DR} =$	***Observed***	$\varphi_{Obs} =$
	$\lambda_{DR} =$		$\lambda_{Obs} =$
Difference			

Explanation



$$\tan\beta'/60 = \frac{h_{LM}/1852}{D'}$$

$$\beta'/60 \to 0$$
$$\Longrightarrow \tan\beta'/60 \approx \beta'/60$$

$$D' = \frac{h_{LM}/1852}{\frac{\beta'}{60}\times\frac{2\pi}{360}} = \frac{h_{LM}\,(m)}{\beta'}\times\frac{2700}{463\pi} \approx \frac{h_{LM}\,(m)}{\beta'}\times\frac{13}{7}$$

HORIZONTAL SEXTANT ANGLES

Date and time	dd.mm.yyyy hh:mm:ss	*GPS position*	$\varphi =$
Course	$CSE =$	*(Reference)*	$\lambda =$
Speed	$SPD =$	*Sextant error*	$(i+S)' =$
Landmarks		$\alpha_{ij} = Snt_{ij} + (i+S)'$	d'_{ij}
1-2.			
2-3.			
$R'_{12} = \frac{{d_{12}}'}{2\sin\alpha_{12}}$	$R'_{12} =$	$R'_{23} = \frac{{d_{23}}'}{2\sin\alpha_{23}}$	$R'_{23} =$
Dead reckoning	$\varphi_{DR} =$	***Observed***	$\varphi_{Obs} =$
	$\lambda_{DR} =$		$\lambda_{Obs} =$
Difference			

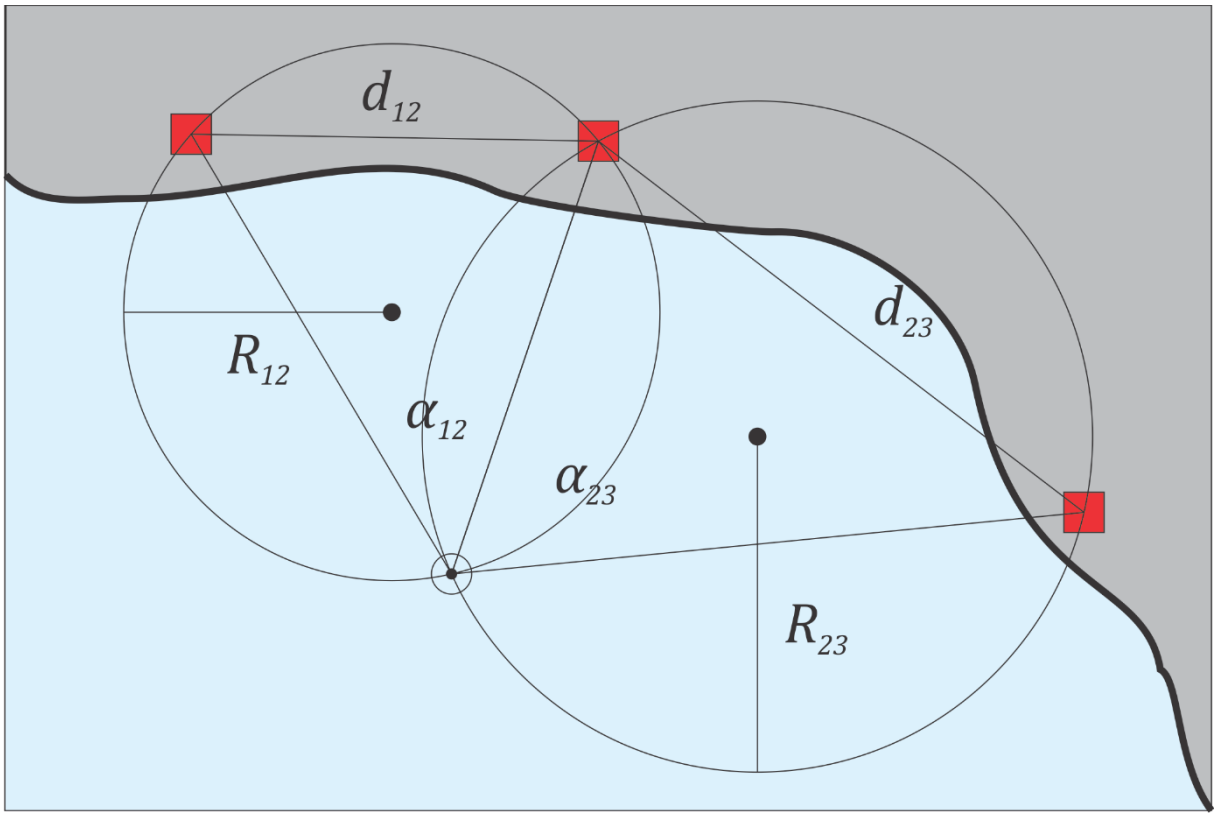
Explanation

Law of sines

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

where R – the triangle's circumradius.

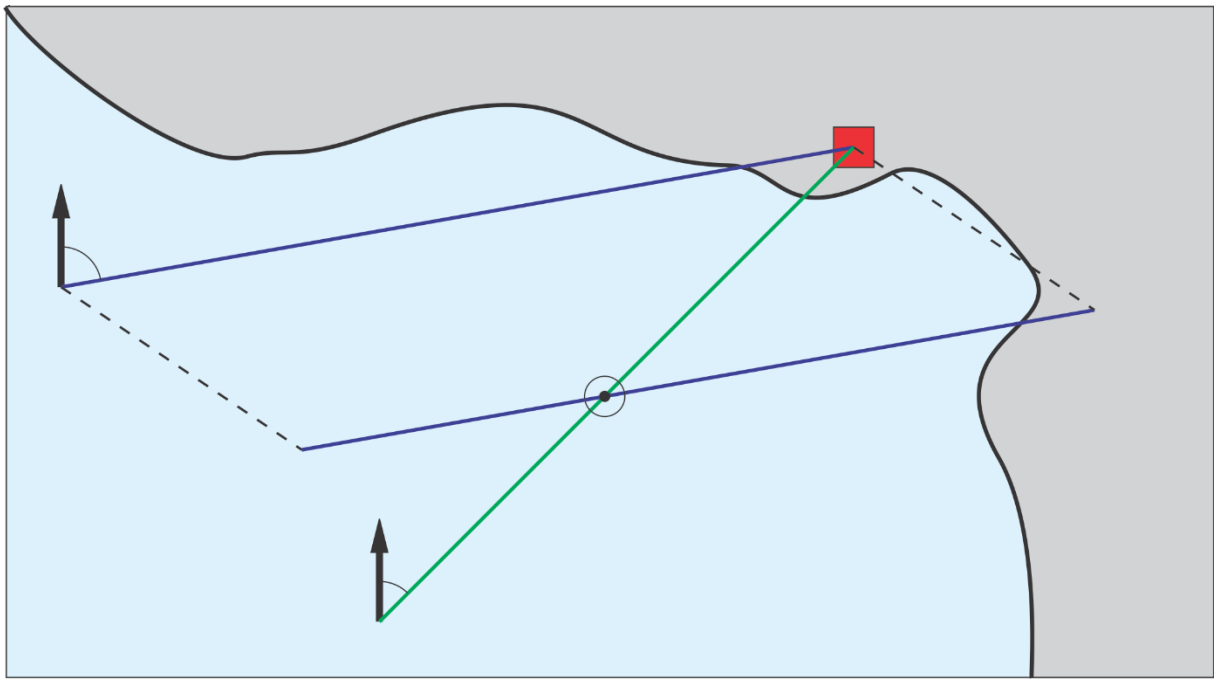
$$R = \frac{d}{2\sin\alpha}$$

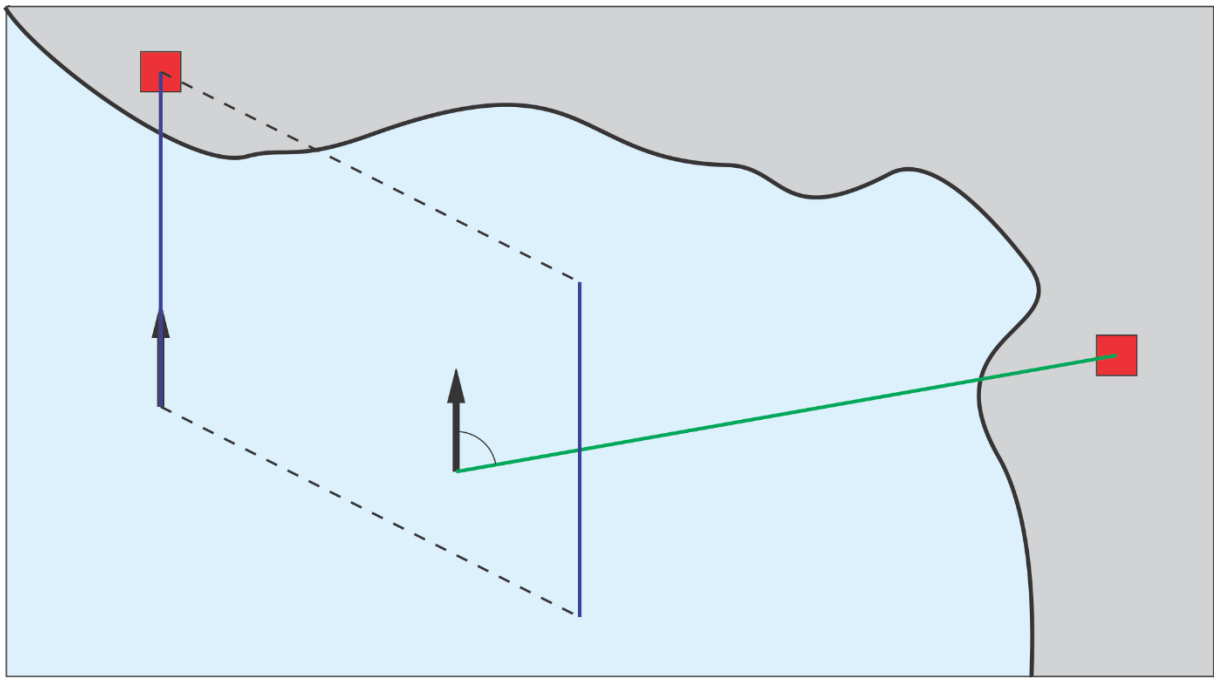


TRANSFERRED POSITION LINES

Date and time	dd.mm.yyyy hh:mm:ss	*GPS position*	$\varphi =$
Course	$CSE =$	*(Reference)*	$\lambda =$
Speed	$SPD =$	*Gyro compass error*	$\Delta GC =$
Landmarks		*Time*	*True bearing* $TB_i = GB_i + \Delta GC$
1.		$T_1 =$	$TB_1 = GB_1 + \Delta GC$ $TB_1 =$
2.		$T_2 =$	$TB_2 = GB_2 + \Delta GC$ $TB_2 =$
$S' = v \cdot \Delta T$	$S' = v \cdot (T_2 - T_1)$	$S' =$	
Dead reckoning	$\varphi_{DR} =$	***Observed***	$\varphi_{Obs} =$
	$\lambda_{DR} =$		$\lambda_{Obs} =$
Difference			

Explanation





1.14 COMPASS ERROR LOG BOOK

Ведение журнала поправок компаса. Требования нормативных документов.

COMPASS OBSERVATION BOOK

Date	GMT	Ship's position	Ship's head	Bearing	Object
04.04.2019	20.55.21 (04.04)	$38°36.6'N$ $037°43.1'W$	$CSE_{Gyro} = 244.8°$ $CSE_{Mag} = 258.0°$ $CSE_{Steer} =$	$BRG_{True} = 277.9°$ $BRG_{Gyro} = 277.0°$ $BRG_{Mag} = 290.2°$	⊙↓ Sunset

Error	Variation	Deviation	Heel	Remarks	Observer
$\Delta_{Gyro} = +0.9°$ $\Delta_{Mag} = -12.3°$ $\Delta_{Steer} =$	$d = -12.5°$	$\delta_{Mag} = +0.2°$ $\delta_{Steer} =$	⊥	SB repeater Easy going vessel	Deck Apprentice

Date	GMT	Ship's position	Ship's head	Bearing	Object
17.04.2019	00.05.59 (18.04)	$22°31.1'N$ $088°27.6'W$	$CSE_{Gyro} = 251.1°$ $CSE_{Mag} = 251.0°$ $CSE_{Steer} =$	$BRG_{True} = 96.4°$ $BRG_{Gyro} = 96.8°$ $BRG_{Mag} = 000.0°$	The Moon

Error	Variation	Deviation	Heel	Remarks	Observer
$\Delta_{Gyro} = -0.4°$ $\Delta_{Mag} = -0.3°$ $\Delta_{Steer} =$	$d = 0.0°$	$\delta_{Mag} = -0.3°$ $\delta_{Steer} =$	⊥	PS repeater Easy going vessel	Deck Apprentice

Date	GMT	Ship's position	Ship's head	Bearing	Object
18.04.2019	00.08.19 (19.04)	$20°42.7'N$ $093°25.0'W$	$CSE_{Gyro} = 240.0°$ $CSE_{Mag} = 237.0°$ $CSE_{Steer} =$	$BRG_{True} = 279.9°$ $BRG_{Gyro} = 279.0°$ $BRG_{Mag} = 276.0°$	⊙ The Sun

Error	Variation	Deviation	Heel	Remarks	Observer
$\Delta_{Gyro} = +0.9°$ $\Delta_{Mag} = +3.9°$ $\Delta_{Steer} =$	$d = +2.0°$	$\delta_{Mag} = +1.9°$ $\delta_{Steer} =$	⊥	SB repeater Easy going vessel	Deck Apprentice

1.15 NAVIGATIONAL EQUIPMENT CERTIFICATION AND DOCUMENTATION

Порядок и сроки освидетельствования навигационного оборудования, ведение документации. Требования нормативных документов.

No.	***Navigational equipment***	***Certification***	***Documentation***
1	LRIT	LRIT conformance test	
2	ECDIS	ECDIS supply certificate for ENCs and RNCs	
3	Compass	Compass certificate	
4	Other nautical related	(Other certificates)	

1.16 FIXING THE POSITION BY 'LORAN-C', 'CHAYKA'

Определение места судна по РНС "Лоран-С", "Чайка" при наличии приёмоиндикаторов. Оценка точности обсервации.

Statement of Fact:

Loran-C is no longer operational.

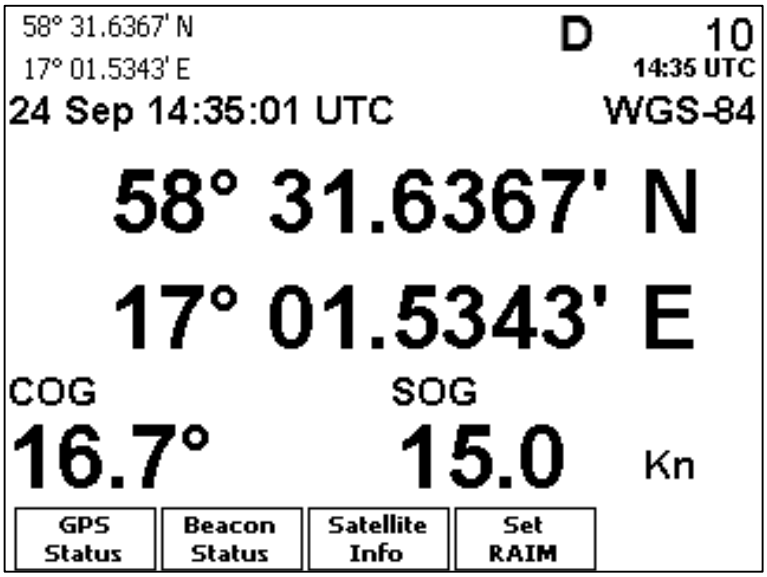
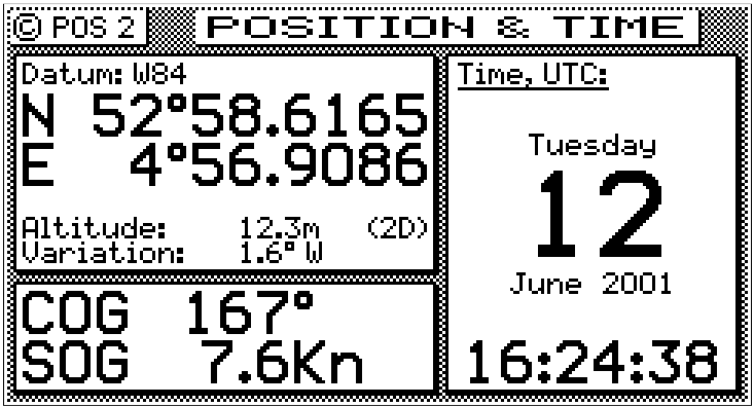
The transmission of Loran-C signals is now permanently discontinued, following the decision to cease transmission by the USA (including the Russian-American chain) and Canada in 2010, the UK and the Europe in 2015.

This should be considered when using volumes of ADMIRALTY Sailing Directions that cover the withdrawn chains.

As to the reality on board, those two position-fixing systems (i.e. "Loran-C" and "Chayka") are not equipped on the vessel.

1.17 FIXING THE POSITION BY GPS, GLONASS

Определение места судна по СРНС GPS и ГЛОНАСС. Оценка точности обсервации.

Equipment	Description
SAAB R4 Navigation System	The Position view shows current position, speed over ground (SOG) and course over ground (COG) as reported by the R4 Navigation Sensor. 
SAM Electronics GmbH DEBEG 4422 / 4428 GPS / DGPS Navigator Systems	POS2 – Position, Altitude, Magnetic Variation, & Time 

Reference: 7.2.5 GPS/ DGPS Receiver

1.18 FIXING THE POSITION BY RADAR

Определение места судна с помощью РЛС. Оценка точности места.

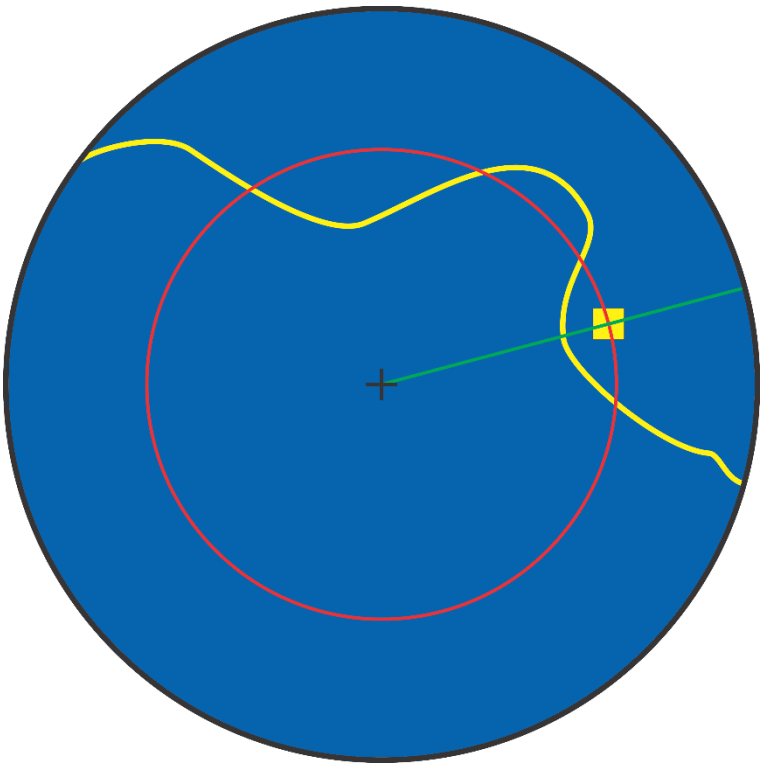
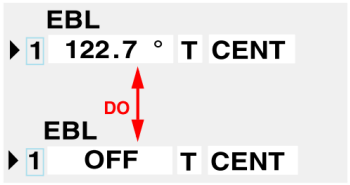
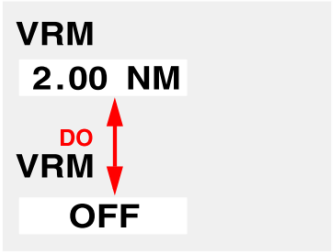
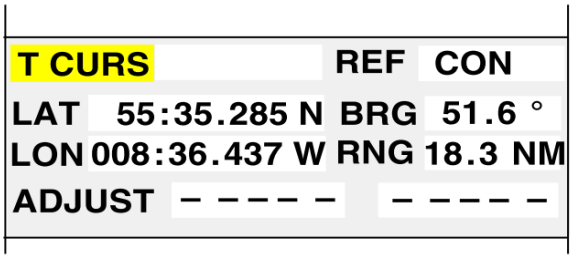


Figure 1.18.1. Fixing the position by radar with EBL and VRM [1.18]

EBL AND VRM

No.	Measurement	Description
1	Electronic Bearing Lines (EBL)	 The radar has two EBL's, which can be adjusted independently of one another. With these EBL's, the bearing of an object with respect to own ship or the bearing between two objects can be determined.

2	Variable Range Markers (VRM)	 The radar has two VRM, which can be adjusted independently of one another. With these markers, the distance from own ship or (in conjunction with the EBL) the distance between two objects can be measured.
3	Cursor Display	 The bearing and range of an object with respect to own ship can most easily and quickly be read off on the cursor display.

Reference: 7.3.1 Maneuvering board. EBL and VRM.

1.19 LOG SPEED ERROR

Определение поправки лага по обсервациям

MEASURING LINE

Moment	Log index	Wave	Wind	Depth
T_1	$Log_{i\,1}$	≤ 3	$\leq 8\,m/s$	$H \geq 6 \cdot T_{draft}$
T_2	$Log_{i\,2}$			
T_3	$Log_{i\,3}$			
T_4	$Log_{i\,4}$			

Leg	Speed	Log error
$1-2$	$V_{12} = \frac{S}{T_2 - T_1}$	$\Delta_{12} = \frac{S - (Log_{i\,2} - Log_{i\,1})}{Log_{i\,2} - Log_{i\,1}} \cdot 100\%$
$2-3$	$V_{23} = \frac{S}{T_3 - T_2}$	$\Delta_{23} = \frac{S - (Log_{i\,3} - Log_{i\,2})}{Log_{i\,3} - Log_{i\,2}} \cdot 100\%$
$3-4$	$V_{34} = \frac{S}{T_4 - T_3}$	$\Delta_{34} = \frac{S - (Log_{i\,4} - Log_{i\,3})}{Log_{i\,4} - Log_{i\,3}} \cdot 100\%$
Mean	$V_{Observed} = \frac{V_{12} + 2 \cdot V_{23} + V_{34}}{4}$	$\Delta_{Log} = \Delta_{Observed} = \frac{\Delta_{12} + 2 \cdot \Delta_{23} + \Delta_{34}}{4}$

$$k_{Log} = 1 + \frac{\Delta_{Log}}{100\%} \Leftrightarrow \Delta_{Log} = (k_{Log} - 1) \cdot 100\%$$

1.20 WATCHKEEPING DOCUMENTATION

Ведение документации по организации штурманской службы и обеспечению безопасности мореплавания

No.	***Document***	***Reference***
1	STCW	
2	COLREG	
3	Dutch regulations	
4	Company's standing order	
5	Master's standing order	
6	Watchkeeping schedule	
7	Bridge log book	
8	Master's special orders	

1.21 OOW'S DUTIES WHEN UNDERWAY, AT ANCHOR AND IN PORT

Обязанности вахтенного помощника капитана на ходу и стоянке при любых условиях

No.	Condition	OOW's duties
1	**Underway**	Keep a proper outlook at all time in compliance with the regulations, using all available means. Avoid collision according to COLREG. Take immediate action and inform the master if the safety of the ship, cargo or crew is in danger. Comply with the company and the Master's standing orders.
2	**At anchor**	Keep a proper outlook at all time in compliance with the regulations, using all available means. Take immediate action and to inform the master if the safety of the ship, cargo or crew is in danger. Comply with the company and the Master's standing orders. Control any sign of drifting vessel or dragging anchor.
3	**In port**	Control for ISPS matters, cargo operation, mooring lines, gangway, etc. Take immediate action and to inform the master if the safety of the ship, cargo or crew is in danger. Comply with the company and the Master's standing orders.

1.22 DEFENSE QUESTIONS

Собеседование

1. Чтение отечественных морских навигационных карт.

   Russian chart reading

2. Чтение английских морских карт.

   ADMIRALTY chart reading

3. Навигационное оборудование морских путей, международная система ограждения опасностей плавучими предостерегательными знаками.

   The IALA Maritime Buoyage System

4. Корректура, комплектование и хранение карт и руководств для плавания на судах гражданских ведомств, подбор карт и пособий на предстоящий переход.

   Chart and publication work

5. Отечественные и английские руководства для плавания, особенности их устройства и использования (лоции, огни и знаки, РТСНО и др.).

   Nautical publications

6. Таблицы приливов, расчёт элементов прилива и приливоотливных течений, построение графика приливов.

   Tide

7. Организация штурманской службы и обязанности штурманского состава.

   Watchkeeping

2 NAUTICAL ASTRONOMY

МОРЕХОДНАЯ АСТРОНОМИЯ

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2.1 TABLE OF ASTRONOMICAL OBSERVATIONS

Журнал учёта ходовых и погожих дней для астрономических наблюдений

No.	Voyage	Observations			
		Sun	Moon	Stars	Planets
1	**Sheerness – Dunkirk**				
2	**Dunkirk – Antwerp**				
3	**Antwerp – Bremen**				
4	**Bremen – Wilmington, NC**	☑		☑	
5	**Wilmington, NC – Veracruz**	☑	☑	☑	
6	**Veracruz – Altamira**	☑		☑	
7	**Altamira – New Orleans**	☑		☑	
8	**New Orleans – Port Everglades**	☑	☑	☑	☑
9	**Port Everglades – St. John's (Antigua)**				

2.2 CHRONOMETER ERROR LOG BOOK

Журнал поправок хронометра по принятой форме, определённых самостоятельно по сигналам точного времени

CHRONOMETER RATE JOURNAL

Date	**GMT**	**Chronometer**	**Error**	**Daily rate**	***t*** ℃	**Remarks**	**Observer**
dd.mm.yyyy	*hh*: *mm*: *ss*	*hh*: *mm*: *ss*	*mm*: *ss*		## ℃		

Statement of Fact:

It is rarely to use chronometer and timer on board, as there are GPS receivers, which provide UTC time with accuracy up to second.

2.3 DIAGRAM OF HEIGHTS ABOVE THE WATER

Схема высот палуб судна, пеленгаторов и глаза наблюдателя

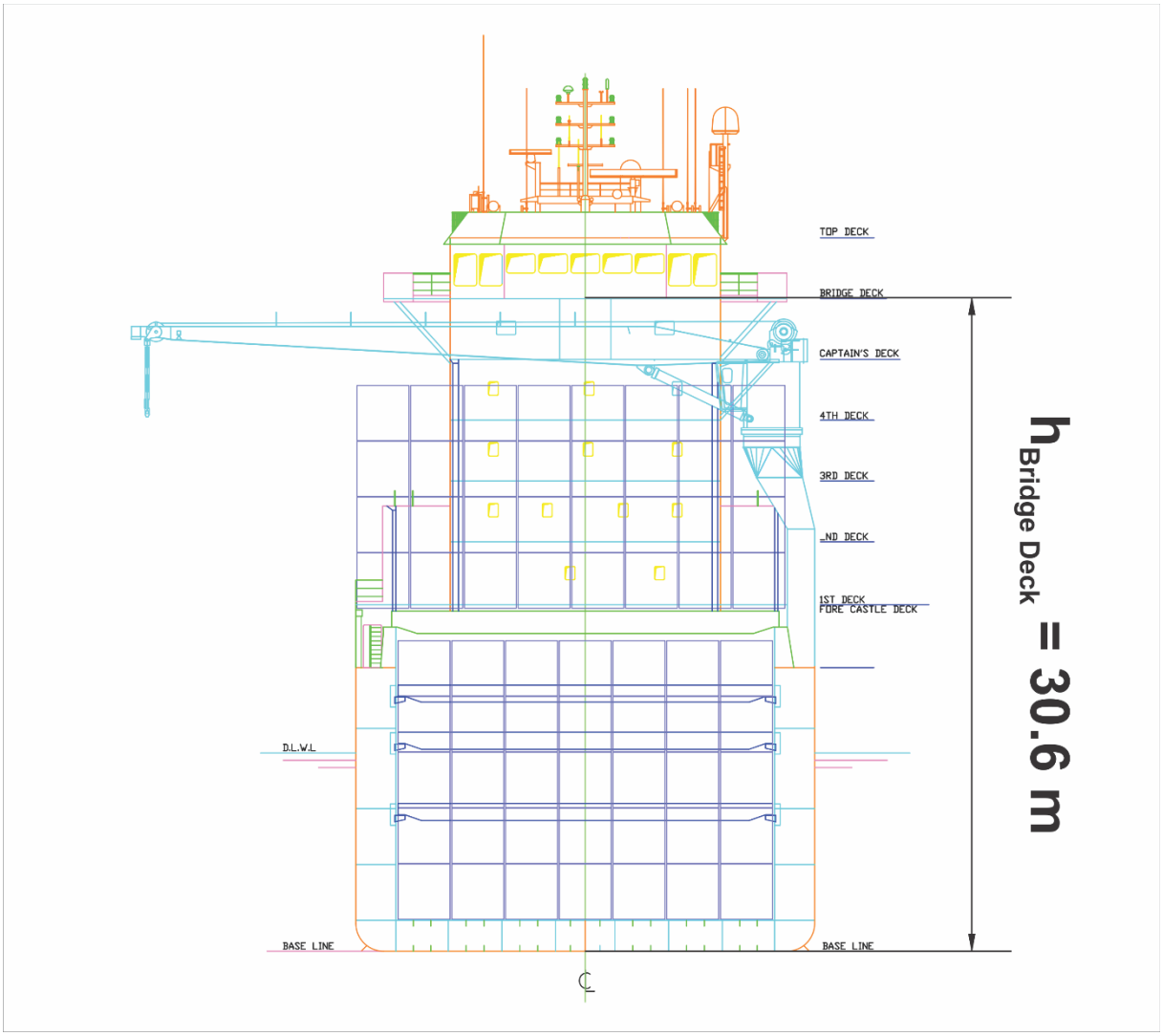


Figure 2.3.1. Height of bridge deck [2.3]

$$h_{Bridge\ Deck\ -\ Base\ Line} = 30.6\ m$$

$$h_{Eyes\ -\ Water} = h_{Bridge\ Deck\ -\ Base\ Line} + h_{Eyes\ -\ Bridge\ Deck} - T$$

$$h_{Eyes\ -\ Water} = 30.6 + 1.8 - T$$

2.4 NAUTICAL INSTRUMENTS

Мореходные инструменты

2.4.1 SEXTANT

Выверка секстана

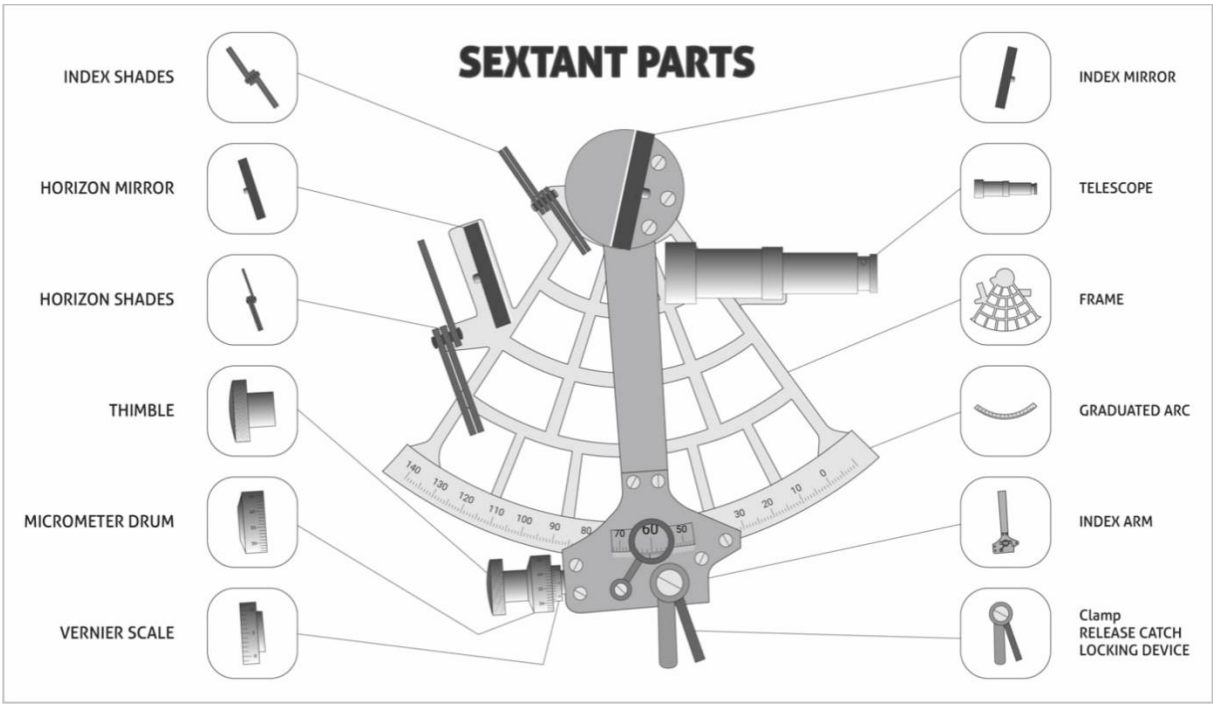


Figure 2.4.1.1. Nautical sextant [2.4]

SEXTANT ADJUSTMENT

Adjustment	**Description**
Collimation error *Устранение непараллельности оптической оси трубы и плоскости лимба секстана*	This is due to the axis of the telescope not being parallel to the plane of the instrument. Checking the error: To check whether the error is present, insert the inverting telescope, setting the eyepiece so that one pair of the cross wires are parallel to the plane of the sextant.

	To check by observation of two stars (selected about 90° apart), move the index arm to bring the two stars into exact contact with each other resting on the wire nearest to the plane of the sextant. Now tilt the sextant upwards so as to bring them on to the wire which is furthest from the plane of the instrument. Should the images diverge or converge from the top intersections of the wires, it must be assumed that an error of collimation exists, and that the axis of the telescope is not parallel to the plane of the instrument. Removing the error: This error can be corrected by adjustment of the two screws in the collar or telescope mounting. The screws are moved together, one being tightened, the other slackened, to align the stars on the top intersection which will bring the telescope back to parallel with the sextant frame. (Not all sextants, however, have adjustable collar screws.)
Perpendicularity error *Устранение неперпендикулярности большого зеркала плоскости лимба*	This is due to the index mirror is not being perpendicular to the plane of the sextant. Checking the error: 1. Place index arm about the middle of the arm. 2. Hold the sextant horizontally with the index mirror up and toward the eye. 3. Observe the direct and reflected views of the sextant arc, if the two views are not joined in a straight line, then index mirror is not perpendicular. Removing the error: Gently turn the 1st adjustment screw on the back of the index mirror until the true and reflected arcs appear in a straight line.
Side error *Устранение неперпендикулярности малого зеркала плоскости лимба*	This is due to the horizon mirror is not being perpendicular to the plane of the sextant. Checking the error by horizon observation: 1. Set the index arm and micrometer exactly to 0°. 2. Hold the sextant horizontally and look thru the horizon mirror at the horizon. 3. If true and reflected images appear in a straight line there is no error. Removing the error by horizon observation: Turn the 2nd adjustment screw on the reverse side of the horizon glass which is away from the frame until the true and reflected horizons appear in a straight line. Checking the error by star observation: 1. Set the index arm and micrometer exactly to 0°. 2. Hold the sextant vertically and look directly at the star. 3. If true and reflected heavenly body appear side by side, then there is side error. Removing the error by horizon observation: Turn the 2nd adjustment screw on the reverse side of the horizon glass which is away from the frame until the true and reflected images pass up and down directly over the direct view of the star.

INDEX ERROR	This is due to the index mirror and horizon mirror are not parallel when the index arm is set exactly to zero. Checking the error by horizon observation: 1. Set the index arm and micrometer exactly to 0°. 2. Hold the sextant vertically and look directly at a horizon. 3. If reflected and true images of horizon are not in a straight line, then index error is present. Removing the error by horizon observation: Use the 3rd adjustment screw until both reflected and true images of the horizon are in strait line. Checking the error by star observation: 1. Set the index arm and micrometer exactly to 0°. 2. Hold the sextant vertically and look directly at the star. 3. If reflected and true images of star are one above the other the error is present. Removing the error by star observation: Use the 3rd adjustment screw until both reflected and true images coincides. Interaction between side error and index error: There is an interaction between the two screws on the horizon mirror when adjusting for the side error, it is possible to introduce for this reason it is necessary to repeat the procedure for side error and index error until no further error can be detected. Otherwise we have to find the value of the index error. Finding the value of index error: 1. Set the index arm and micrometer exactly to 0°. 2. Hold the sextant vertically and look directly at a star or the horizon. 3. Adjust the micrometer drum until the reflected and true images of the horizon is in strait line or star coincides. 4. Check now the reading and calculate the error, which they are on the arc or off the arc. Apply index error to the sextant reading: Index error on the arc is minus. Index error off the arc is plus.

2.4.2 CHRONOMETER, CLOCK AND TIMER

Качество работы хронометра, палубных часов, секундомера и других инструментов

Statement of Fact:

It is rarely to use chronometer and timer on board, as there are GPS receivers, which provide UTC time with accuracy up to second.

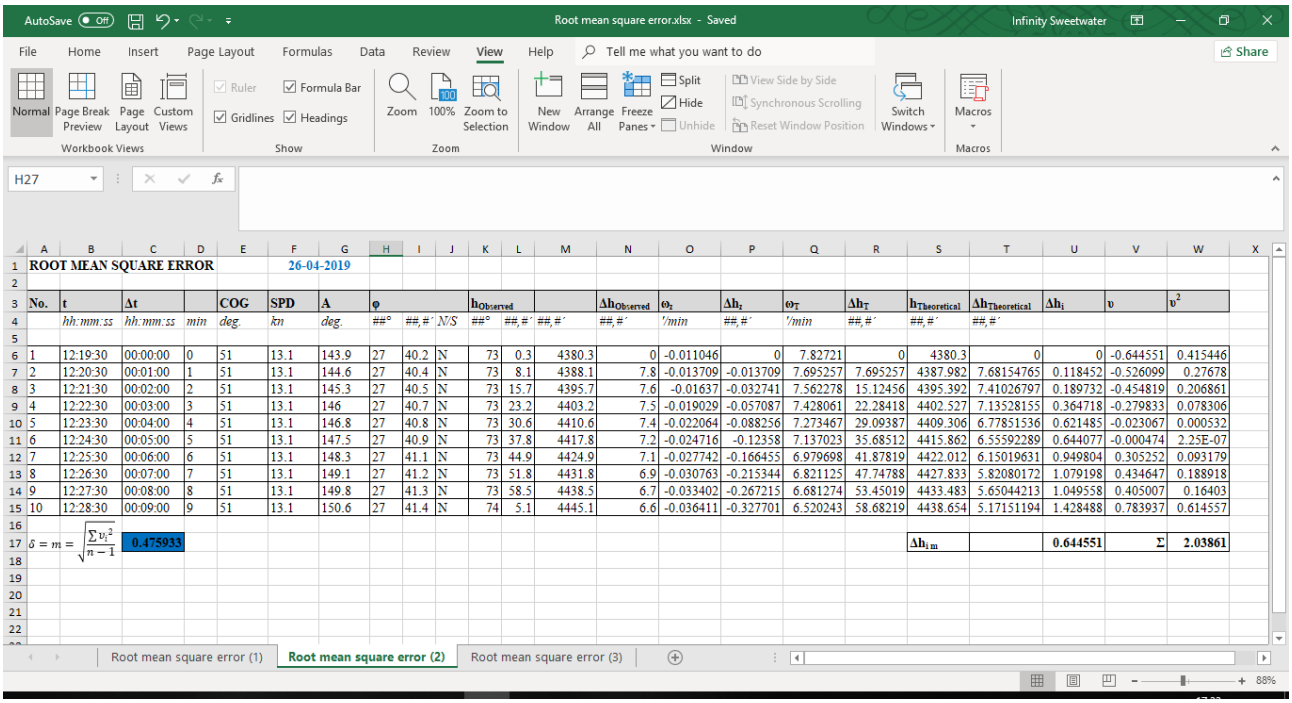
2.4.3 SEXTANT INDEX ERROR

Ряд серий определения поправки индекса секстана различными способами

No.	Method	Value
1	**By horizon/ star observation** $i = \pm(0° - S_i) = \pm(360° - S_i)$ Index error on the arc is minus. Index error off the arc is plus.	04.04.2019 – By horizon observation $S_i = 359°58.2'$ – on the arc $i = -(360° - 359°58.2') = -0°01.8'$
2	**By the Sun** $S_{R\|T} = S_1$ – Reflected above true $S_{T\|R} = S_2$ – Reflected below true $i = 360° - \frac{S_1 + S_2}{2}$	04.04.2019 $S_1 = 0°29.2'$ – off the arc $S_2 = 0°33.8'$ – on the arc $i = 360° - \frac{359°29.2' + 360°33.8'}{2} = -0°01.5'$ 16.04.2019 $S_1 = 0°31'$ – off the arc $S_2 = 0°29.2'$ – on the arc $i = 360° - \frac{359°31.0' + 360°29.2'}{2} = -0°00.1'$

2.4.4 ROOT MEAN SQUARE ERROR

Ряд серий измерения высот Солнца и звёзд, их СКП. При этом разности между теоретическими и фактическими изменениями высоты светила не должны превышать одной минуты.



No.	t	Δt		COG	SPD	A	φ			$h_{Observed}$			$\Delta h_{Observed}$	ω_z	Δh_z	ω_T	Δh_T	$h_{Theoretical}$	$\Delta h_{Theoretical}$	Δh_i	v	v^2
	hh:mm:ss	hh:mm:ss	min	deg.	kn	deg.	## °	##,# ´	N/S	## °	##,# ´	##,#´	##,#´	´/min	##,#´	´/min	##,#´	##,#´	##,#´			
1	12:19:30	00:00:00	0	51	13.1	143.9	27	40.2	N	73	0.3	4380.3	0	-0.011046	0	7.82721	0	4380.3	0	0	-0.644551	0.415446
2	12:20:30	00:01:00	1	51	13.1	144.6	27	40.4	N	73	8.1	4388.1	7.8	-0.013709	-0.013709	7.695257	7.695257	4387.982	7.68154765	0.118452	-0.526099	0.27678
3	12:21:30	00:02:00	2	51	13.1	145.3	27	40.5	N	73	15.7	4395.7	7.6	-0.01637	-0.032741	7.562278	15.12456	4395.392	7.41026797	0.189732	-0.454819	0.206861
4	12:22:30	00:03:00	3	51	13.1	146	27	40.7	N	73	23.2	4403.2	7.5	-0.019029	-0.057087	7.428061	22.28418	4402.527	7.13528155	0.364718	-0.279833	0.078306
5	12:23:30	00:04:00	4	51	13.1	146.8	27	40.8	N	73	30.6	4410.6	7.4	-0.022064	-0.088256	7.273467	29.09387	4409.306	6.77851536	0.621485	-0.023067	0.000532
6	12:24:30	00:05:00	5	51	13.1	147.5	27	40.9	N	73	37.8	4417.8	7.2	-0.024716	-0.12358	7.137023	35.68512	4415.862	6.55592289	0.644077	-0.000474	2.25E-07
7	12:25:30	00:06:00	6	51	13.1	148.3	27	41.1	N	73	44.9	4424.9	7.1	-0.027742	-0.166455	6.979698	41.87819	4422.012	6.15019631	0.949804	0.305252	0.093179
8	12:26:30	00:07:00	7	51	13.1	149.1	27	41.2	N	73	51.8	4431.8	6.9	-0.030763	-0.215344	6.821125	47.74788	4427.833	5.82080172	1.079198	0.434647	0.188918
9	12:27:30	00:08:00	8	51	13.1	149.8	27	41.3	N	73	58.5	4438.5	6.7	-0.033402	-0.267215	6.681274	53.45019	4433.483	5.65044213	1.049558	0.405007	0.16403
10	12:28:30	00:09:00	9	51	13.1	150.6	27	41.4	N	74	5.1	4445.1	6.6	-0.036411	-0.327701	6.520243	58.68219	4438.654	5.17151194	1.428488	0.783937	0.614557
$\delta = m = \sqrt{\frac{\sum v_i^2}{n-1}}$		0.475933																$\Delta h_{i\,m}$		0.644551	Σ	2.03861

Figure 2.4.4.1. Root mean square error of The Sun's altitude change per minute [2.4]

No.	Change of The Sun's Altitude	Formula
1	Due to the ship movement	$\omega_{hz} = \frac{SPD}{60} \cdot \cos(A - COG)\ \ (^{\prime}/min)$ $\Delta h_z = \omega_{hz} \cdot \Delta t$
2	Due to the daily movement of the celestial body	$\omega_{hT} = 15 \cdot \cos\varphi \cdot \sin A\ \ (^{\prime}/min)$ $\Delta h_T = \omega_{hT} \cdot \Delta t$
3	Root mean square error	$\Delta h_{i\,m} = \overline{\Delta h_i} = \frac{\sum \Delta h_i}{n}$ $v_i = \Delta h_i - \overline{\Delta h_i}$ $\delta = m = \sqrt{\frac{\sum {v_i}^2}{n-1}}$

2.5 STAR FINDER

Планирование наблюдения, поставленная цель. Звёздный глобус, подбор светил для наблюдения. Обсервации с избыточными линиями положения.

STAR FINDER AND IDENTIFIER (NP 323)

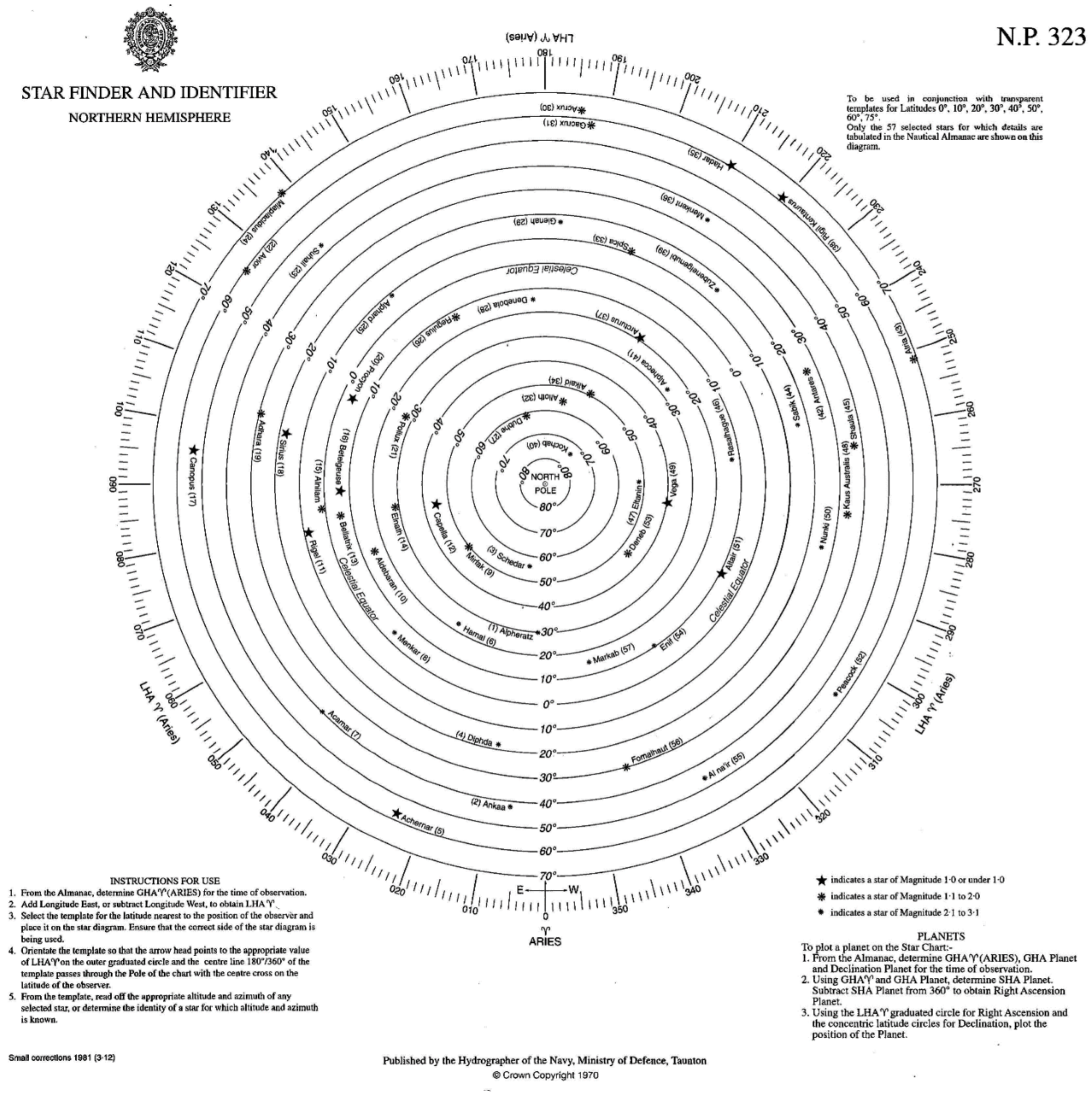


Figure 2.5.1. Star Finder and Identifier (NP 323) – Northern Hemisphere [2.5]

Step	How-to Use	Remark
1	From the Almanac, determine GHA ♈ (Aries) for the time of observation.	
2	Add Longitude East, or subtract Longitude West, to obtain LHA ♈.	
3	Select the template for the latitude nearest to the position of the observer and place it on the star diagram. Ensure that the correct side of the star diagram is being used.	
4	Orientate the template so that the arrow head points to the appropriate value of LHA ♈ on the outer graduated circle and the centre line 180°/360° of the template passes through the Pole of the chart with the centre cross on the latitude of the observer.	
5	From the template, read off the appropriate altitude and azimuth of any selected star, or determine the identity of a star for which altitude and azimuth is known.	

STELLARIUM

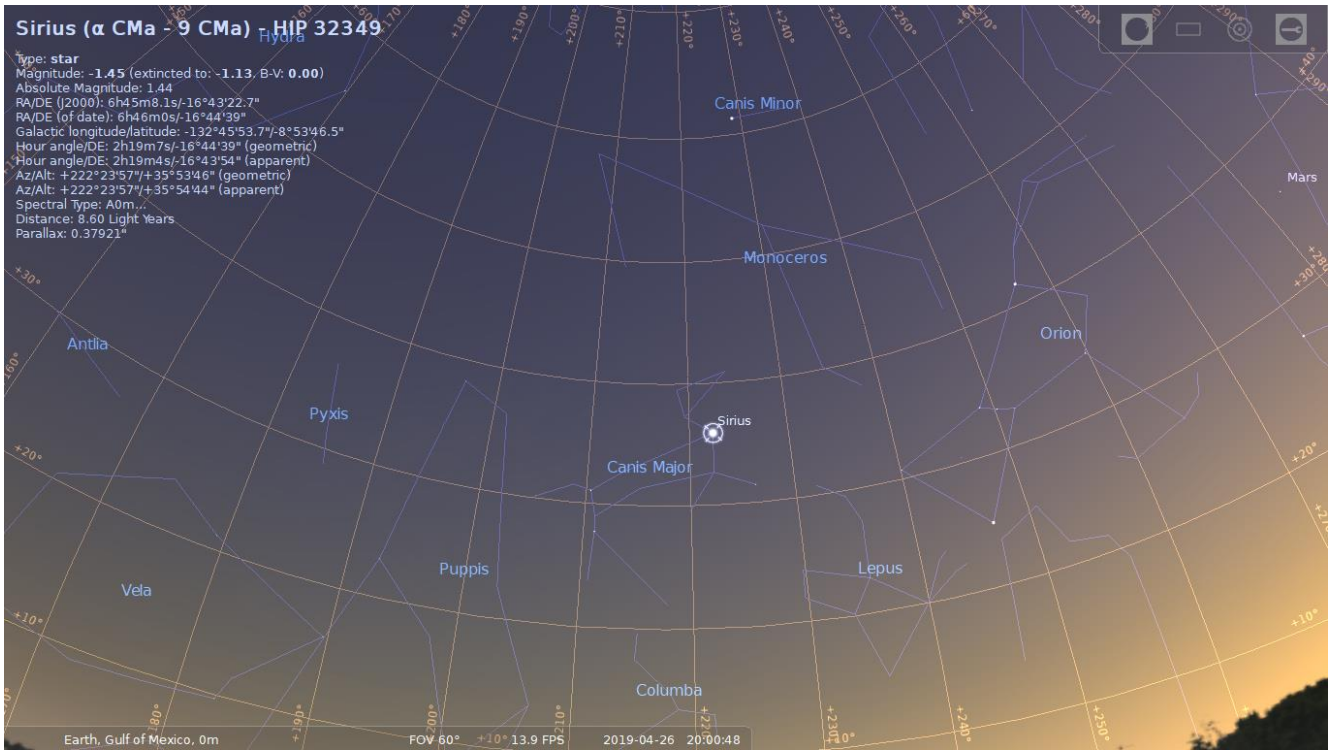


Figure 2.5.2. Stellarium [2.5]

2.6 COMPASS ERROR

Определение поправки гироскопического и магнитного компасов на каждой ходовой вахте и при изменении курса, причина её изменения. Решение задач на определение поправки компаса различными астрономическими способами.

DETERMINING AZIMUTH AND ALTITUDE

Method 1: By a calculating table

$\tan x = \frac{\tan \delta}{\cos t}$ $x = \arctan \frac{\tan \delta}{\cos t}$	$\tan A = \frac{\tan t \cdot \cos x}{\sin(x \sim \varphi)}$ $\tan h = \frac{\cos A}{\tan(x \sim \varphi)}$

$S(\alpha) = 2 \cdot 10^4 \cdot \log \sec \alpha = 2 \cdot 10^4 \cdot \log \frac{1}{\cos \alpha}$ $\alpha = \arccos 10^{\frac{-S(\alpha)}{2 \cdot 10^4}}$
$T(\alpha) = 2 \cdot 10^4 \cdot \log \tan \alpha + 70725$ $\alpha = \arctan 10^{\frac{T(\alpha) - 70725}{2 \cdot 10^4}}$

δ		$T(\delta)$					
t		$+S(t)$		$T(t)$			
x		$\Rightarrow T(x)$		$-S(x)$			
φ				$\Rightarrow T(p)$			
$y = 90° + (x \sim \varphi)$				$+S(y)$		$T(y)$	
A				$\Rightarrow T(A)$		$-S(A)$	
h						$\Rightarrow T(h)$	

Method 2: By formulas

$$\boldsymbol{\sin h = \sin \varphi \cdot \sin \delta + \cos \varphi \cdot \cos \delta \cdot \cos t}$$

$$\sin A = \cos \delta \cdot \sin t \cdot \sec h = \cos \delta \cdot \sin t \cdot \frac{1}{\cos h}$$

$$sinA = \frac{sin(90° - \delta) \cdot sint}{cosh}$$

$$\boldsymbol{A = arcsin \frac{sin(90° - \delta) \cdot sint}{cosh}}$$

$$\cot A = \tan \delta \cdot \cos \varphi \cdot \csc t - \sin \varphi \cdot \cot t$$

$$\cot A = \tan \delta \cdot \cos \varphi \cdot \frac{1}{\sin t} - \sin \varphi \cdot \cot t$$

$$\boldsymbol{\cos h = \cos \delta \cdot \sin t \cdot \csc A = \cos \delta \cdot \sin t \cdot \frac{1}{\sin A}}$$

$$ctgA \cdot sint = ctg(90° - \delta) \cdot sin(90° - \varphi) - cos(90° - \varphi) \cdot cost$$

$$\boldsymbol{A = arctg \frac{sint}{ctg(90° - \delta) \cdot sin(90° - \varphi) - cos(90° - \varphi) \cdot cost}}$$

ALTITUDE CORRECTIONS

The Sun	⊙	**The Moon**	19.05.59 (17.04.2019)
Sextant index		*Sextant index*	$17° 30.3'$
$(i + S)'$		$(i + S)'$	$-0.1'$
$-\Delta h_d$ *(DIP)*		$-\Delta h_d$ *(DIP)*	$-7.9'$
$\Rightarrow h_B$ *(App. Alt. H)*		$\Rightarrow h_B$ *(App. Alt. H)*	$17° 22.3'$
$\rightarrow \Delta h_\rho$ *(Refraction)*		$\rightarrow \Delta h_\rho$ *(Refraction)*	$-3.1'$
Δh_p *(PA)*		Δh_p *(PA)*	$+57.2'$ $(HP = 60.1')$
$R_\odot$ *(SD)*		R_{Moon} *(SD)*	$+16.3'$ $(SD = 16.3')$
$\Rightarrow h_{Corrected}$		$\Rightarrow h_{Corrected}$	$18° 32.7'$
$- h_{Calculated}$		$- h_{Calculated}$	
$\Rightarrow \Delta h$		$\Rightarrow \Delta h$	

The Stars	$*$	**The Planets**	
Sextant index		*Sextant index*	
$(i + S)'$		$(i + S)'$	
$-\Delta h_d$ *(DIP)*		$-\Delta h_d$ *(DIP)*	
$\Rightarrow h_B$ *(App. Alt. H)*		$\Rightarrow h_B$ *(App. Alt. H)*	
$\rightarrow \Delta h_\rho$ *(Refraction)*		$\rightarrow \Delta h_\rho$ *(Refraction)*	
$\rightarrow \Delta h_t$ *(Temp.)*		Δh_p *(PA)*	
$\rightarrow \Delta h_B$ *(Pressure)*			
(Δh_z)			
$\Rightarrow h_{Corrected}$		$\Rightarrow h_{Corrected}$	
$- h_{Calculated}$		$- h_{Calculated}$	
$\Rightarrow \Delta h$		$\Rightarrow \Delta h$	

BY MOMENTS / BY NORIE'S NAUTICAL TABLES (A, B, C TABLES)

Step 1:

Date	18.04.2019	φ_{GPS}	$20° 42.7' N$
$T_S = T_{LT}$	19.08.19 (UTC -5)	λ_{GPS}	$093° 25.0' W$
T_{Chr}		$N_W^E = \frac{\lambda_{GPS}}{15}$	
U_{Chr}		BRG_{Gyro}	$\mathbf{279.0°}$

$T_{UTC} = T_{LT} \mp N_W^E$		$T_{UTC} = T_{Chr} + U_{Chr}$	00.08.19 (19.04.2019)

Step 2:

Object	**The Sun**/ The Moon/ Planets	The Star	$*$
$t^{\odot}_{Almanac}$	$180° 10.4' \ (d = 0.9)$	$t^{\gamma}_{Almanac}$	
Δ_1	$2° 04.8'$	Δ	
Δ_2	$0.1'$	$\Rightarrow t^{\gamma}_{UTC}$	
$\Rightarrow t^{\odot}_{UTC}$		$\pm \lambda^E_W$	
$\pm \lambda^E_W$	$-093° 25.0' W$	$\Rightarrow t^{\gamma}_{LT}$	
$\Rightarrow t^{\odot}_{LT}$	$088° 50.3' W$	τ	
		$\Rightarrow t^{*}_{LT}$	

$\delta^{\odot}_{Almanac}$	$10° 59.8' N$	$\delta^{*}_{Almanac}$	
Δ	$0.1'$		
$\Rightarrow \delta^{\odot}$	$10° 59.9' N$		

$$ctgA \cdot sint = ctg(90° - \delta) \cdot sin(90° - \varphi) - co\,s(90° - \varphi) \cdot cost$$

$$\boldsymbol{A = arctg \frac{sint}{ctg(90° - \delta) \cdot sin(90° - \varphi) - co\,s(90° - \varphi) \cdot cost} \approx 279.9°}$$

Step 3:

$BRG_{True} = A$	$\Delta_{Gyro} = BRG_{True} - BRG_{Gyro} = \mathbf{279.9° - 279.0° = +0.9°}$

BY ALTITUDES

Step 1:

Date	17.04.2019	φ_{GPS}	$22° 31.1' N$
$T_S = T_{LT}$	19.05.59 (UTC -5)	λ_{GPS}	$088° 27.6' W$
T_{Chr}		$N_W^E = \frac{\lambda_{GPS}}{15}$	
U_{Chr}		BRG_{Gyro}	096.8°

$T_{UTC} = T_{LT} \mp N_W^E$		$T_{UTC} = T_{Chr} + U_{Chr}$	00.05.59 (18.04.2019)

Step 2:

Object	The Sun/ **The Moon**/ Planets	The Star	*
$\boldsymbol{h_{Corrected}}$	$18° 32.7'$	$\boldsymbol{h_{Corrected}}$	
$\delta^{\odot}_{Almanac}$	$1° 24.0' N$ $(d = 13.7)$	$\delta^{*}_{Almanac}$	
Δ	$1.3'$		
$\Rightarrow \delta^{\odot}$	$1° 25.3' N$		

$$cos(90° - \delta) = cos(90° - \varphi) \cdot cos(90° - h) + sin(90° - \varphi) \cdot sin(90° - h) \cdot cosA$$

$$\boldsymbol{A = arccos \frac{cos(90° - \delta) - cos(90° - \varphi) \cdot cos(90° - h)}{sin(90° - \varphi) \cdot sin(90° - h)} \approx 096.4°}$$

Step 3:

$BRG_{True} = A$	096.4°
$- BRG_{Gyro}$	$-096.8°$
$\Rightarrow \Delta_{Gyro}$	$-0.4°$

BY SUNRISE/ SUNSET (ALTITUDES $h = 0°$)

Step 1:

Date	18.04.2019	φ_{GPS}	$20° 40.4' N$
$T_S = T_{LT}$	19.30.37 (UTC -5)	λ_{GPS}	$093° 29.3' W$
$e_{Eyes}\ (m)$	$20\ m$	$B\ (mmHg)$	$760\ mmHg$
t (°C)	25 °C	BRG_{Gyro}	280.6°

Step 2:

Δh_d	$-7.9'$	$h_B = 0° 00.0'$
Δh_t	$+2.9'$	
Δh_B	$+0.0'$	
$\Rightarrow \Delta h$	$-5.0'$	

Step 3:

$A_{Tabulated}$	282.3°	
ΔA_φ	$+0.8' \approx +0.01°$	
ΔA_λ	$+4.7' \approx +0.08°$	E – previous W – next
ΔA_e	$-0.1°$	(A, B, K, Δh) $\Delta A = -0.017 \cdot \tan\varphi \cdot \Delta h \cdot \frac{1}{\sin A}$
$\Rightarrow A$	282.3°	

Step 4:

$BRG_{True} = A$	282.3°
$- BRG_{Gyro}$	$-280.6°$
$\Rightarrow \Delta_{Gyro}$	$+1.7°$

Alternative: Norie's Nautical Tables – True Azimuths at Rising and Setting

BY ALTITUDES AND MOMENTS

Step 1:

Date	18.04.2019	φ_{GPS}	$20° 40.4' N$
$T_S = T_{LT}$	19.30.37 (UTC -5)	λ_{GPS}	$093° 29.3' W$
T_{Chr}		$N_W^E = \frac{\lambda_{GPS}}{15}$	
U_{Chr}		BRG_{Gyro}	$\mathbf{280.6°}$

$T_{UTC} = T_{LT} \mp N_W^E$		$T_{UTC} = T_{Chr} + U_{Chr}$	00.30.37 (19.04.2019)

Step 2:

Object	The Sun/ The Moon/ Planets	The Star	*
$t^{\odot}_{Almanac}$	$180° 10.4' \ (d = 0.9)$	$t^{\gamma}_{Almanac}$	
Δ_1	$7° 39.3'$	Δ	
Δ_2	$0.5'$	$\Rightarrow t^{\gamma}_{UTC}$	
$\Rightarrow t^{\odot}_{UTC}$		$\pm \lambda^E_W$	
$\pm \lambda^E_W$	$-093° 29.3 W$	$\Rightarrow t^{\gamma}_{LT}$	
$\Rightarrow t^{\odot}_{LT}$	$094° 20.9' W$	τ	
		$\Rightarrow t^{*}_{LT}$	

$\delta^{\odot}_{Almanac}$	$10° 59.8' N$	$\delta^{*}_{Almanac}$	
Δ	$0.5'$		
$\Rightarrow \delta^{\odot}$	$11° 00.3' N$		

$\sin A = \cos\delta \cdot \sin t \cdot \sec h = \cos\delta \cdot \sin t \cdot \frac{1}{\cos h}$ $sinA = \frac{sin(90° - \delta) \cdot sint}{cosh}$	$\mathbf{\sin h = \sin\varphi \cdot \sin\delta + \cos\varphi \cdot \cos\delta \cdot \cos t}$ $\mathbf{\Rightarrow h \approx -0° 07.7'}$ $\mathbf{A = arcsin\frac{sin(90° - \delta) \cdot sint}{cosh} \approx -78.2°}$

Step 3:

$BRG_{True} = A = 281.8°$	$\Delta_{Gyro} = BRG_{True} - BRG_{Gyro} = 281.8° - 280.6° = +1.2°$

BY POLARIS/ POLE STAR (ALTITUDES AND MOMENTS)

Step 1:

Date	26.04.2019	φ_{GPS}	$28° 53.4' N$
$T_S = T_{LT}$	20.24.01	λ_{GPS}	$089° 20.5' W$
T_{Chr}		$N_W^E = \frac{\lambda_{GPS}}{15}$	
U_{Chr}		BRG_{Gyro}	358.4°

$T_{UTC} = T_{LT} \mp N_W^E$	01.24.01 (27.04.2019)	$T_{UTC} = T_{Chr} + U_{Chr}$	

Step 2:

Polaris	*	**Polaris**	*
$t^{\gamma}_{Almanac}$	$229° 43.9'$	*Sextant index*	$28° 56.3'$
Δ	$6° 01.2'$	$(i + S)'$	$-0.1'$
$\Rightarrow t^{\gamma}_{UTC}$		$-\Delta h_d$ *(DIP)*	$-8.8'$
$\pm \lambda^E_W$	$-089° 20.5' W$	$\Rightarrow h_B$ *(App. Alt. H)*	$28° 47.4'$
$\Rightarrow t^{\gamma}_{LT}$	$146° 24.6'$	$\rightarrow \Delta h_\rho$ *(Refraction)*	$-1.8'$
		$\rightarrow \Delta h_t$ *(Temp.)*	$+0.1'$
		$\rightarrow \Delta h_B$ *(Pressure)*	$+0.0'$
		(Δh_z)	
		$\Rightarrow h_{Corrected}$	$28° 45.7'$

Step 3: Polaris Tables

$BRG_{True} = A$	359.3°
$- BRG_{Gyro}$	$-358.4°$
$\Rightarrow \Delta_{Gyro}$	$+0.9°$

2.7 CELESTIAL FIXING THE POSITION

Методы астрономического определения места судна. Составляющие невязки, оценка прошедшего плавания. Эллипс вероятного места судна в наиболее интересных и ответственных обсервациях.

2.7.1 BY THE SUN

Дневными обсервациями по Солнцу

Step 1:

Date	**27.04.2019**	$\varphi_{GPS\,1}$	$28°\ 53.4'\ N$	$e\ (m)$	$25\ m$
$T_S = T_{LT}$		$\lambda_{GPS\,1}$	$089°\ 20.5'\ W$	$(i+S)'$	$-0.1'$
COG	$000.0°$	$N_W^E = \frac{\lambda_{GPS1}}{15}$		U_{chr}	
SOG	$0\ kn$			$\Delta Log\ (\%)$	

The Sun	$T_{chr\,i}$	*Sextant index*	$T_{S\,i} = T_{LT\,i}$	*Log index*
⊙ 1		$h = 73°\ 38.2'$	12.28.18	
⊙ 2		$h = 69°\ 52.6'$	13.52.26	

$T_{UTC\,1} = T_{LT\,1} \mp N_W^E$	17.28.18	$T_{UTC\,2} = T_{LT\,2} \mp N_W^E$	18.52.26

$T_{UTC\,1} = T_{chr\,1} + U_{chr}$		$T_{UTC\,2} = T_{chr\,2} + U_{chr}$	

Step 2:

$$\Delta Log_i = Log_2 - Log_1$$
$$k_{Log} = 1 + \frac{\Delta Log\ (\%)}{100}$$
$$S_{Distance} = k_{Log} \cdot \Delta Log_i$$

$$\Delta\varphi = S_{Distance} \cdot \cos COG$$
$$\Delta\omega = S_{Distance} \cdot \sin COG$$
$$\varphi_m = \frac{\varphi_{GPS\,1} + \varphi_{DR\,2}}{2}$$
$$\Delta\lambda = \frac{\Delta\omega}{\cos\varphi_m} = \frac{S_{Distance} \cdot \sin COG}{\cos\left(\frac{\varphi_{GPS\,1} + \varphi_{GPS\,2}}{2}\right)}$$

$\varphi_{GPS\,1}$	$28°\ 53.4'\ N$	$\lambda_{GPS\,1}$	$089°\ 20.5'\ W$
$\Delta\varphi$	$00°\ 00.0'$	$\Delta\lambda$	$000°\ 00.0'$
$\varphi_{DR\,2}$	$28°\ 53.4'\ N$	$\lambda_{DR\,2}$	$089°\ 20.5'\ W$

Step 3:

The Sun	⊙ 1	⊙ 2
$t^{\odot}_{Almanac}$	$75°\ 35.1'\ (d = 0.8)$	$90°\ 35.2'\ (d = 0.8)$
Δ_1	$7°\ 04.5'$	$13°\ 06.5'$
Δ_2	$0.4'$	$0.7'$
$\Rightarrow t^{\odot}_{UTC}$		
$\pm\lambda^{E}_{W}$	$-089°\ 20.5'\ W$	$-089°\ 20.5'\ W$
$\Rightarrow t^{\odot}_{LT}$	$-6°\ 40.5'\ E = 353°\ 19.5'\ W$	$14°\ 21.9'\ W$

$\delta^{\odot}_{Almanac}$	$13°\ 53.8'\ N$	$13°\ 54.6'\ N$
Δ	$0.4'$	$0.7'$
$\Rightarrow \delta^{\odot}$	$13°\ 54.2'\ N$	$13°\ 55.3'\ N$

$$\sin h = \sin\varphi \cdot \sin\delta + \cos\varphi \cdot \cos\delta \cdot \cos t$$

$$A = arcsin\frac{sin(90° - \delta) \cdot sint}{cosh}$$

$$A = arctg\frac{sint}{ctg(90° - \delta) \cdot sin(90° - \varphi) - cos(90° - \varphi) \cdot cost}$$

$$A = arccos\frac{cos(90° - \delta) - cos(90° - \varphi) \cdot cos(90° - h)}{sin(90° - \varphi) \cdot sin(90° - h)}$$

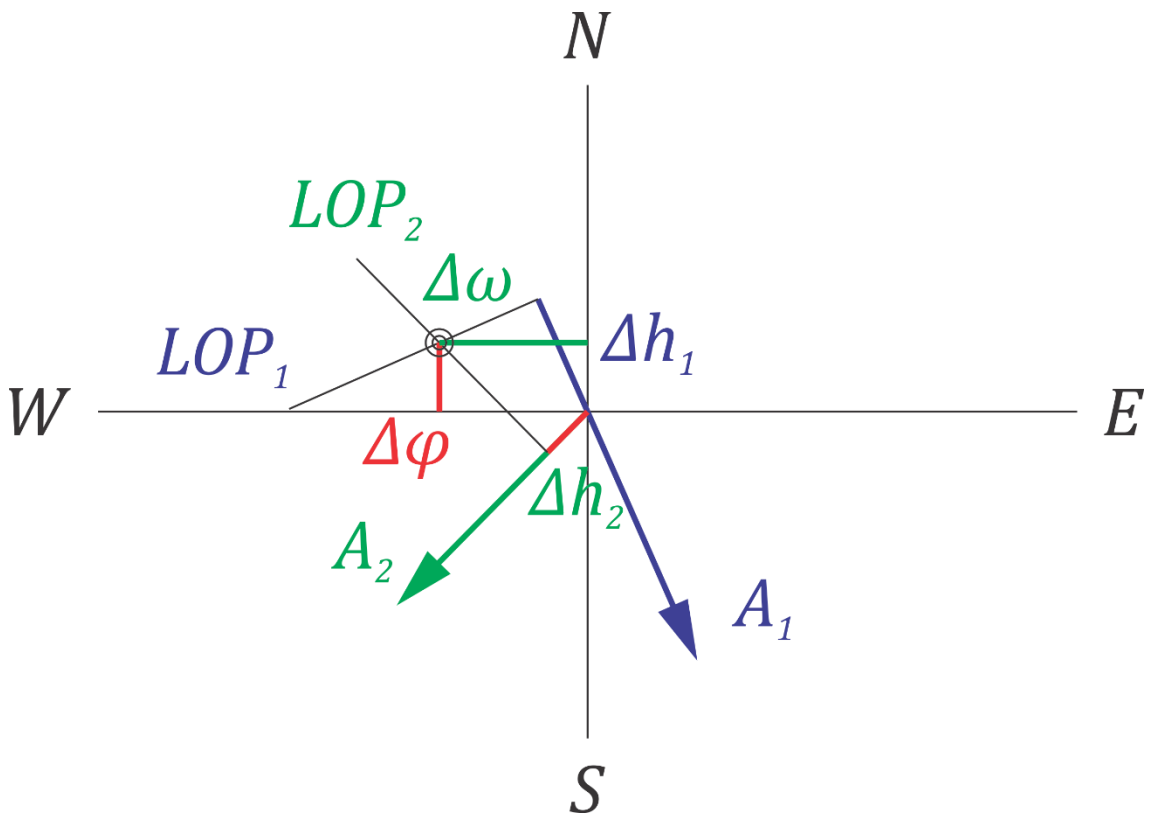
The Sun	⊙ 1	⊙ 2
h	$73°\ 47.1'$	$69°\ 58.1'$
A	$156.2°$	$224.6°$

Step 4:

The Sun	⊙ 1	⊙ 2
Sextant index	$73° 38.2'$	$69° 52.6'$
$(i + S)'$	$-0.1'$	$-0.1'$
$-\Delta h_d$ *(DIP)*	$-8.8'$	$-8.8'$
$\Rightarrow h_B$ *(App. Alt. H)*	$73° 29.3'$	$69° 43.7'$
$\rightarrow \Delta h_\rho$ *(Refraction)*	$-0.4'$	$-0.4'$
Δh_p *(PA)*	$+0.04'$	$+0.05'$
$R_\odot$ *(SD)*	$+15.9'$	$+15.9'$
$\Rightarrow h_{Corrected}$	$73° 44.84'$	$69° 59.15'$
$- h_{Calculated}$	$-73° 47.1'$	$-69° 58.1'$
$\Rightarrow \Delta h$	$-2.26'$	$+1.05'$

Step 5:

Graphical solution

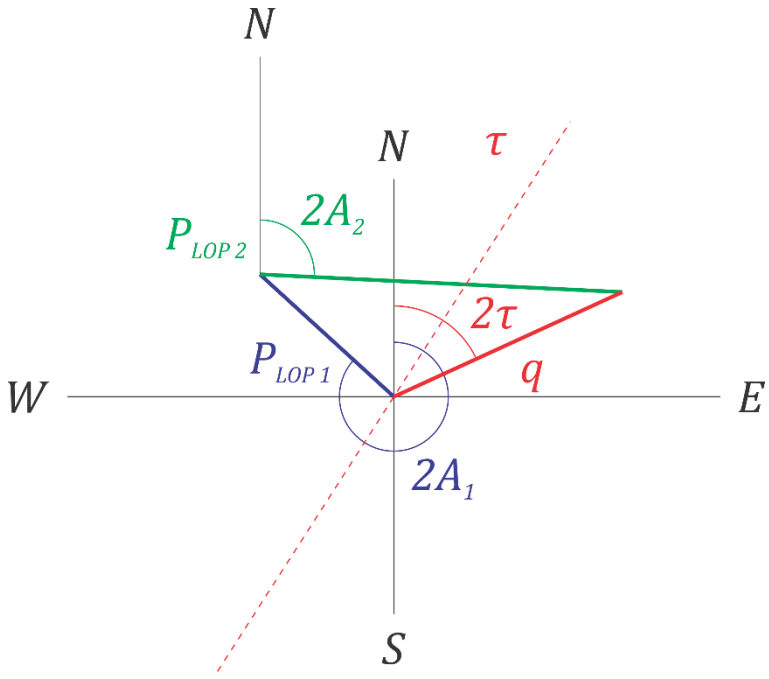


Result	$\Delta\varphi = +1.2682'$ $\Delta\lambda = \frac{\Delta\omega}{\cos\varphi_{DR\,2}} = \frac{-2.7251}{\cos(28°\,53.4')} \approx -3.1124'$

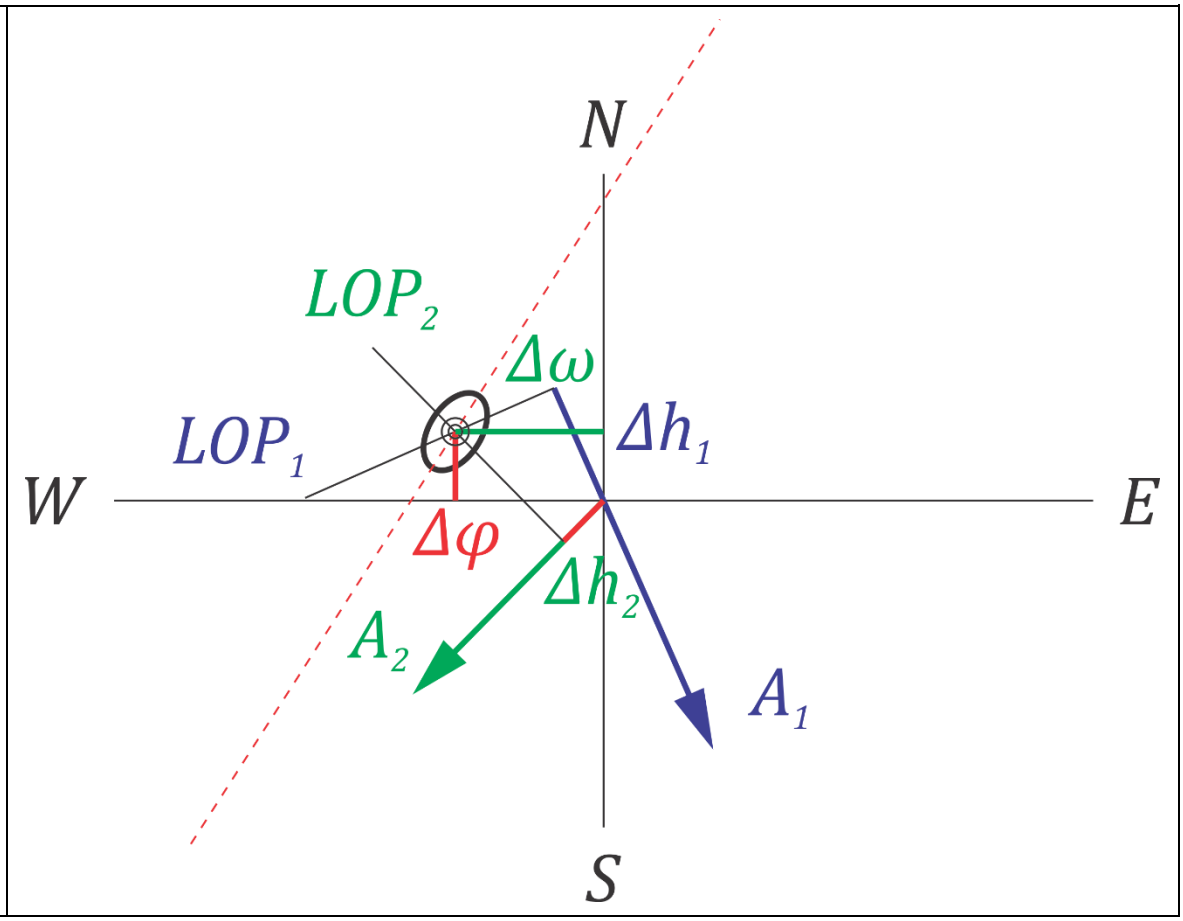
$\varphi_{DR\,2}$	$28°\,53.4'\ N$	$\lambda_{DR\,2}$	$089°\,20.5'\ W$
$\Delta\varphi$	$+1.2682'$	$\Delta\lambda$	$-3.1124'$
$\boldsymbol{\varphi_{Obs}}$	$\mathbf{28°\,54.6682'\ N}$	$\boldsymbol{\lambda_{Obs}}$	$\mathbf{089°\,17.3879'\ W}$

Step 6: Accuracy evaluation

LOP	P_{LOP}	*A*	2*A*
1	$P_{LOP\,1} = 0.5$	156.2°	312.4°
2	$P_{LOP\,2} = 1$	224.6°	92.8°

Graphical solution	

$P_{max} + P_{min} = \sum P_{LOP\,i} = 1.5$	$P_{max} = 1.09625$
$P_{max} - P_{min} = q = 0.6925$	$P_{min} = 0.40375$
$a = \pm\frac{1}{\sqrt{P_{min}}} = \pm\frac{1}{\sqrt{0.40375}} = \pm 1.5738'$	$b = \pm\frac{1}{\sqrt{P_{max}}} = \pm\frac{1}{\sqrt{1.09625}} = \pm 0.9551'$
$2\tau = 65.3958°$	$\tau = 32.6979°$

Graphical solution	

2.7.2 BY ALTITUDES

В малых широтах – способом соответствующих высот

BY POLARIS/ POLE STAR'S ALTITUDE

Step 1:

Date	26.04.2019	φ_{GPS}	$28° 53.4' N$
$T_S = T_{LT}$	20.24.01	λ_{GPS}	$089° 20.5' W$
T_{Chr}		$N_W^E = \frac{\lambda_{GPS}}{15}$	
U_{Chr}			

$T_{UTC} = T_{LT} \mp N_W^E$	01.24.01 (27.04.2019)	$T_{UTC} = T_{Chr} + U_{Chr}$	

Step 2:

Polaris	$*$	**Polaris**	$*$
$t_{Almanac}^{\gamma}$	$229° 43.9'$	*Sextant index*	$28° 56.3'$
Δ	$6° 01.2'$	$(i + S)'$	$-0.1'$
$\Rightarrow t_{UTC}^{\gamma}$		$-\Delta h_d$ *(DIP)*	$-8.8'$
$\pm \lambda_W^E$	$-089° 20.5' W$	$\Rightarrow h_B$ *(App. Alt. H)*	$28° 47.4'$
$\Rightarrow t_{LT}^{\gamma}$	$146° 24.6'$	$\rightarrow \Delta h_\rho$ *(Refraction)*	$-1.8'$
		$\rightarrow \Delta h_t$ *(Temp.)*	$+0.1'$
		$\rightarrow \Delta h_B$ *(Pressure)*	$+0.0'$
		$\Rightarrow h_{Corrected}$	$28° 45.7'$

Step 3: Polaris Tables

$BRG_{True} = A$	359.3°

Step 4: Polaris Tables

Polaris	Almanac	**Polaris**	MAE
$h_{Corrected}$	$28° 45.7'$	$h_{Corrected}$	
$-1°$	$-1°$	I	
$+a_0$	$+1° 07.487'$	II	
$+a_1$	$+0.5'$	III	
$+a_2$	$+1.0'$	$\Rightarrow \boldsymbol{\varphi_{Observed}}$	
$\Rightarrow \boldsymbol{\varphi_{Observed}}$	$28° 54.687'$	$-\varphi_{DR}$	
$-\varphi_{DR}$		$\Rightarrow \Delta\varphi$	
$\Rightarrow \Delta\varphi$			

BY THE SUN'S ALTITUDES

Step 1:

Date	01.05.2019	φ_{GPS}	$25° 13.5' N$
$T_S = T_{LT}$	12.46.00	λ_{GPS}	$087° 00.8' W$
T_{Chr}		$N_W^E = \frac{\lambda_{GPS}}{15}$	
COG	118.0°	SOG	$12.0\ kn$

$T_{UTC} = T_{LT} \mp N_W^E$	17.46.00 (01.05.2019)	$T_{UTC} = T_{Chr} + U_{Chr}$	

$T_{UTC\ 1}$	16.46.00	$h_1 = h_E$	
$T_{UTC\ 2}$	17.46.00	$h_2 = h_{max}$	$79° 49.8'$
$T_{UTC\ 3}$	18.46.00	$h_3 = h_W$	

$T_{UTC\ mean} = \frac{T_{UTC\ 1} + T_{UTC\ 3}}{2}$	**17.46.00**

Step 2:

The Sun	⊙ 1	⊙ 2	⊙ 3
$t_{Almanac}^{\odot}$		$75° 43.3' (d = 0.7)$	
Δ_1		$11° 30.0'$	
Δ_2		$0.5'$	
$\Rightarrow t_{UTC}^{\odot}$		$87° 13.8'$	

$\delta_{Almanac}^{\odot}$		$15° 08.2' N$	
Δ		$0.5'$	
$\Rightarrow \delta^{\odot}$		$15° 08.7' N$	

Step 3:

Meridian Altitude	⊙	**Maximum Altitude**	⊙
Sextant index		*Sextant index*	$79° 49.8'$
$(i + S)'$		$(i + S)'$	$-0.1'$
$-\Delta h_d$ *(DIP)*		$-\Delta h_d$ *(DIP)*	$-8.8'$
$\Rightarrow h_B$ *(App. Alt. H)*		$\Rightarrow h_B$ *(App. Alt. H)*	$79° 40.9'$
$\rightarrow \Delta h_\rho$ *(Refraction)*		$\rightarrow \Delta h_\rho$ *(Refraction)*	$-0.2'$
Δh_p *(PA)*		Δh_p *(PA)*	$+0.03'$
$\pm R_{\odot}^{\ Upper}$ *(SD)*		$\pm R_{\odot}^{\ Upper}$ *(SD)*	$+15.9'$
$\Rightarrow h_{Corrected} = H_\odot$		$\Rightarrow h_{Corrected} = h_{max}$	$79° 56.63'$
$Z = 90° - H_\odot$		$Z = 90° - h_{max}$	$10° 03.37'$
$+\delta_\odot$		$+\delta_\odot$	$+15° 08.7'\ N$
$\Rightarrow \varphi_1$		$\Rightarrow \varphi_1$	$25° 12.07'$
		$\pm\Delta\varphi$	
		$\Rightarrow \boldsymbol{\varphi_{Observed}}$	

$\Delta = \Delta\delta_\odot/hour$	$0.75'$
$\Psi = SOG \cdot \cos COG$	$-5.63'$
$\Delta\varphi = \left(\frac{\Delta - \Psi}{21.7}\right)^2 \cdot (\tan\varphi_1 - \tan\delta_\odot)$	$+0.02'$
$t_0 = 3.82 \cdot (\tan\varphi_1 - \tan\delta_\odot) \cdot (\Delta - \Psi)$	$+4.87'$

Step 4:

φ_1	$25° 12.07'$	$t_{UTC}^{\odot}$	$87° 13.8'$
$\pm\Delta\varphi$	$+0.02'$	t_0	$+4.87'$
$\Rightarrow \boldsymbol{\varphi_{Observed}}$	$25° 12.09'$	$\Rightarrow \boldsymbol{\lambda_{Observed} = \lambda_W}$	$87° 18.67'$

2.7.3 BY STARS

В утренние и вечерние сумерки – по одновременным наблюдениям светил

Step 1:

Date	26.04.2019	φ_{GPS}	28° 53.4′ N	$e\ (m)$	25 m
$T_S = T_{LT}$		λ_{GPS}	089° 20.5′ W	$(i+S)'$	$-0.1'$
COG	000.0°	$N_W^E = \frac{\lambda_{GPS}}{15}$		U_{chr}	
$SOG = v$	0 kn			t_{Air}°	20 ℃
$\Delta Log\ (\%)$				$B\ (mmHg)$	760 $mmHg$

The Stars	$T_{chr\ i}$	*Sextant index*	$T_{S\ i} = T_{LT\ i}$	*Log index*
Sirius		28° 12.3′	20.18.08	
Polaris		28° 56.3′	20.24.01	

$T_{UTC\ 1} = T_{LT\ 1} \mp N_W^E$	01.18.08 (27.04.2019)	$T_{UTC\ 2} = T_{LT\ 2} \mp N_W^E$	01.24.01 (27.04.2019)

$T_{UTC\ 1} = T_{chr\ 1} + U_{chr}$		$T_{UTC\ 2} = T_{chr\ 2} + U_{chr}$	

Step 2:

The Stars	∗ 1 – **Sirius**	∗ 2 – **Polaris**
$t_{Almanac}^{\gamma}$	229° 43.9′	229° 43.9′
Δ	4° 32.7′	6° 01.2′
$\Rightarrow t_{UTC}^{\gamma}$		
$\pm\ \lambda_W^E$	$-089°\ 20.5'\ W$	$-089°\ 20.5'\ W$
$\Rightarrow t_{LT}^{\gamma}$		
τ	258° 30.4′	316° 27.7′
$\Rightarrow t_{LT}^{*}$	43° 26.5′ W	102° 52.3′ W

$\delta_{Almanac}^{*}$	16° 44.9′ S	89° 20.6′ N

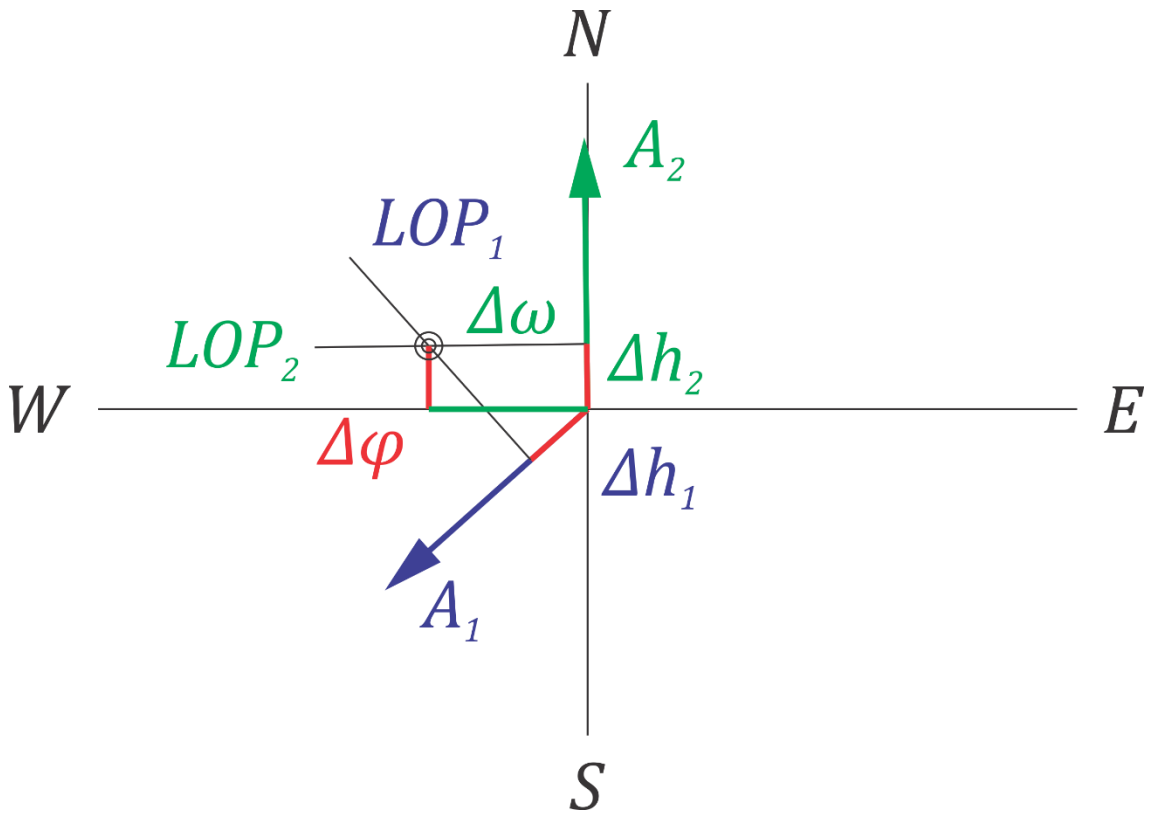
$\sin h = \sin\varphi \cdot \sin\delta + \cos\varphi \cdot \cos\delta \cdot \cos t$
$A = arcsin\dfrac{sin(90° - \delta) \cdot sint}{cosh}$ $A = arctg\dfrac{sint}{ctg(90° - \delta) \cdot sin(90° - \varphi) - cos(90° - \varphi) \cdot cost}$ $A = arccos\dfrac{cos(90° - \delta) - cos(90° - \varphi) \cdot cos(90° - h)}{sin(90° - \varphi) \cdot sin(90° - h)}$

The Stars	∗ 1 – **Sirius**	∗ 2 – **Polaris**
h	28° 00.2′	28° 44.5′
A	228.2°	359.3°

Step 3:

The Stars	∗ 1	∗ 2
Sextant index	28° 12.3′	28° 56.3′
$(i + S)'$	−0.1′	−0.1′
$-\Delta h_d$ *(DIP)*	−8.8′	−8.8′
⇒ h_B *(App. Alt. H)*	28° 03.4′	28° 47.4′
→ Δh_ρ *(Refraction)*	−1.9′	−1.8′
→ Δh_t *(Temp.)*	+0.1′	+0.1′
→ Δh_B *(Pressure)*	+0.0′	+0.0′
(Δh_z)		
⇒ $h_{Corrected}$	28° 01.6′	28° 45.7′
$-\ h_{Calculated}$	−28° 00.2′	−28° 44.5′
⇒ Δh	+1.4′	+1.2′

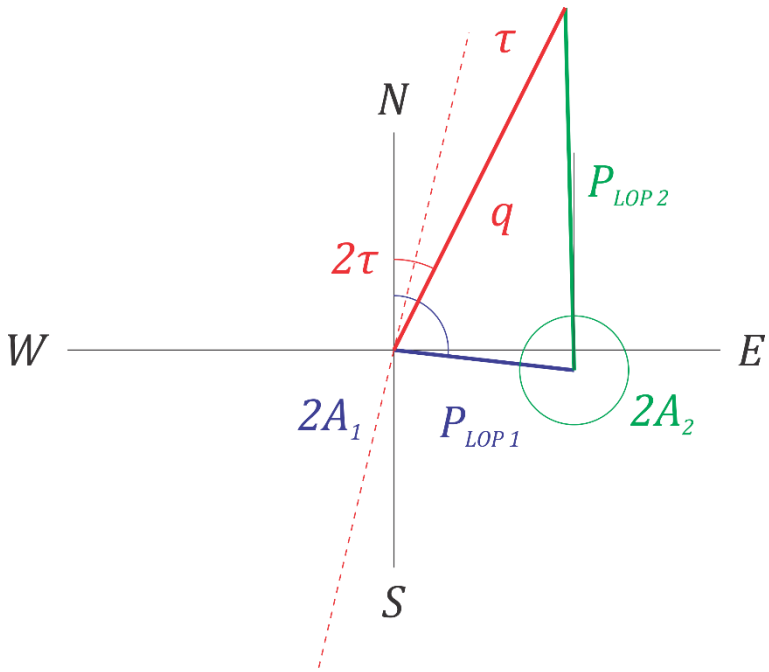
Step 4:

Graphical solution	
Result	$\Delta\varphi = +1.1644'$ $\Delta\lambda = \frac{\Delta\omega}{\cos\varphi_m} = \frac{-2.9191}{\cos(28°\ 53.4' + \frac{1.1644'}{2})} \approx -3.3343'$

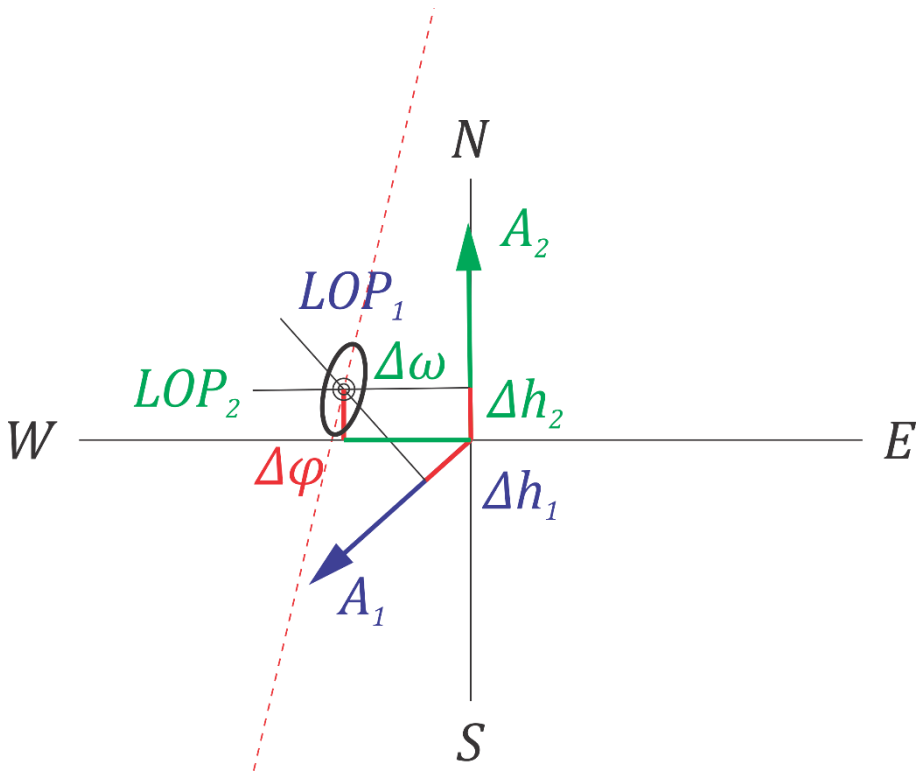
φ_0	$28°\ 53.4'\ N$	λ_0	$089°\ 20.5'\ W$
$\Delta\varphi$	$+1.1644'$	$\Delta\lambda$	$-3.3343'$
$\boldsymbol{\varphi_{Obs}}$	$\mathbf{28°\ 54.5644'\ N}$	$\boldsymbol{\lambda_{Obs}}$	$\mathbf{089°\ 17.1657'\ W}$

Step 5: Accuracy evaluation

LOP	P_{LOP}	A	$2A$
1	$P_{LOP\ 1} = 0.5$	228.2°	96.4°
2	$P_{LOP\ 2} = 1$	359.3°	358.6°

Graphical solution	

$P_{max} + P_{min} = \sum P_{LOP\,i} = 1.5$	$P_{max} = 1.2778$
$P_{max} - P_{min} = q = 1.0556$	$P_{min} = 0.2222$
$a = \pm\frac{1}{\sqrt{P_{min}}} = \pm\frac{1}{\sqrt{0.2222}} = \pm 2.1214'$	$b = \pm\frac{1}{\sqrt{P_{max}}} = \pm\frac{1}{\sqrt{1.2778}} = \pm 0.8846'$
$2\tau = 26.5876°$	$\tau = 13.2938°$

Graphical solution	

Note:

$\Delta Log_i = Log_2 - Log_1$ $k_{Log} = 1 + \frac{\Delta Log}{100}$	$S_{Distance} = k_{Log} \cdot \Delta Log_i$
$\Delta h_z = \Delta h_v \cdot (T_2 - T_1)$ $\Delta h_v = \frac{v}{60} \cdot \cos(A - COG)$	$\Delta h_z = S \cdot \cos(A - COG)$ $\Delta h_z = \frac{v}{60} \cdot (T_2 - T_1) \cdot \cos(A - COG)$
$M_{Obs} = \frac{1}{\sin \Delta A} \cdot \sqrt{{m_{LOP\,1}}^2 + {m_{LOP\,2}}^2}$ $M_{Obs} = \frac{1}{\sin \Delta A} \cdot \sqrt{2} \cdot m_{LOP\,i}$ $(m_{LOP\,i} = 1.0')$	

2.7.4 BY THE SUN, THE MOON AND VENUS

Дневными обсервациями по Солнцу, Луне и Венере

Step 1:

Date	**01.05.2019**	$\varphi_{GPS\ 07.07}$	25° 45.3′ N	$e\ (m)$	25 m
$T_S = T_{LT}$		$\lambda_{GPS\ 07.07}$	088° 06.7′ W	$(i+S)'$	−0.1′
COG	118.0°	$N_W^E = \frac{\lambda_{GPS1}}{15}$		U_{chr}	
SOG	11.6 kn			$\Delta Log\ (\%)$	

Object	$T_{chr\ i}$	*Sextant index*	$T_{S\ i} = T_{LT\ i}$	*Log index*
1	13.00.00	$h = 22° 13.3'$	08.00.00	306.00’
2	13.09.00	$h = 44° 37.5'$	08.09.00	307.69’
3	13.19.24	$h = 44° 40.4'$	08.19.24	309.64’

$T_{UTC\ 1} = T_{LT\ 1} \mp N_W^E$	13.00.00	$T_{UTC\ 1} = T_{chr\ 1} + U_{chr}$	
$T_{UTC\ 2} = T_{LT\ 2} \mp N_W^E$	13.09.00	$T_{UTC\ 2} = T_{chr\ 2} + U_{chr}$	
$T_{UTC\ 3} = T_{LT\ 3} \mp N_W^E$	13.19.24	$T_{UTC\ 3} = T_{chr\ 3} + U_{chr}$	

Step 2:

$\Delta Log_i = Log_2 - Log_1 = 306.0 - 294.0 = 12.0'$

$k_{Log} = 1 + \frac{\Delta Log\ (\%)}{100}$

$S_{Distance} = k_{Log} \cdot \Delta Log_i = 12.0'$

$\Delta\varphi = S_{Distance} \cdot \cos COG$

$\Delta\omega = S_{Distance} \cdot \sin COG$

$\varphi_m = \frac{\varphi_{GPS\ 1} + \varphi_{DR\ 2}}{2}$

$\Delta\lambda = \frac{\Delta\omega}{\cos\varphi_m} = \frac{S_{Distance} \cdot \sin COG}{\cos\left(\frac{\varphi_{GPS\ 1} + \varphi_{GPS\ 2}}{2}\right)}$

$\varphi_{GPS\ 07.07}$	25° 45.3′ N	$\lambda_{GPS\ 07.07}$	088° 06.7′ W
$\Delta\varphi$	−00° 05.6′	$\Delta\lambda$	+000° 11.8′
$\varphi_{DR\ 1}$	25° 39.7′ N	$\lambda_{DR\ 1}$	087° 54.9′ W
$\varphi_{GPS\ 08.00}$	25° 40.4′ N	$\lambda_{GPS\ 08.00}$	087° 56.7′ W

$\varphi_{DR\ 1}$	$25°\ 39.7'\ N$	$\lambda_{DR\ 1}$	$087°\ 54.9'\ W$
$\Delta\varphi$	$-00°\ 00.8'$	$\Delta\lambda$	$+000°\ 01.7'$
$\varphi_{DR\ 2}$	$25°\ 38.9'\ N$	$\lambda_{DR\ 2}$	$087°\ 53.2'\ W$

$\varphi_{DR\ 2}$	$25°\ 38.9'\ N$	$\lambda_{DR\ 2}$	$087°\ 53.2'\ W$
$\Delta\varphi$	$-00°\ 00.9'$	$\Delta\lambda$	$+000°\ 01.9'$
$\varphi_{DR\ 3}$	$25°\ 38.0'\ N$	$\lambda_{DR\ 3}$	$087°\ 51.3'\ W$
$\varphi_{GPS\ 08.19.24}$	$25°\ 38.8'\ N$	$\lambda_{GPS\ 08.19.24}$	$087°\ 53.5'\ W$

Step 3:

Objects	1 – The Sun	2 – The Moon	3 – Venus
$t^{\odot}_{Almanac}$	$15°\ 43.0'\ (d = 0.7)$	$51°\ 03.5'\ (v = 15.3')$	$41°\ 24.3'\ (v = -0.3)$
Δ_1	$0°\ 00.0'$	$2°\ 08.9'$	$4°\ 51.0'$
Δ_2	$0.0'$	$2.4'$	$-0.1'$
$\Rightarrow t^{\odot}_{UTC}$			
$\pm\ \lambda^{E}_{W}$	$-087°\ 54.9'\ W$	$-087°\ 53.2'\ W$	$-087°\ 51.3'\ W$
$\Rightarrow t^{\odot}_{LT}$	$-72°\ 11.9'\ E$ $= 287°\ 48.1'\ W$	$-34°\ 38.4'\ E$ $= 325°\ 21.6'\ W$	$-41°\ 36.1'\ E$ $= 318°\ 23.9'\ W$

$\delta^{\odot}_{Almanac}$	$15°\ 05.2'\ N$	$-3°\ 50.8'\ S\ (d = 11.3')$	$3°\ 40.4'\ N\ (d = 1.2')$	
Δ	$0.0'$	$1.8'$	$0.4'$	
$\Rightarrow \delta^{\odot}$	$15°\ 05.2'\ N$	$3°\ 49.0'\ S$	$3°\ 40.8'\ N$	

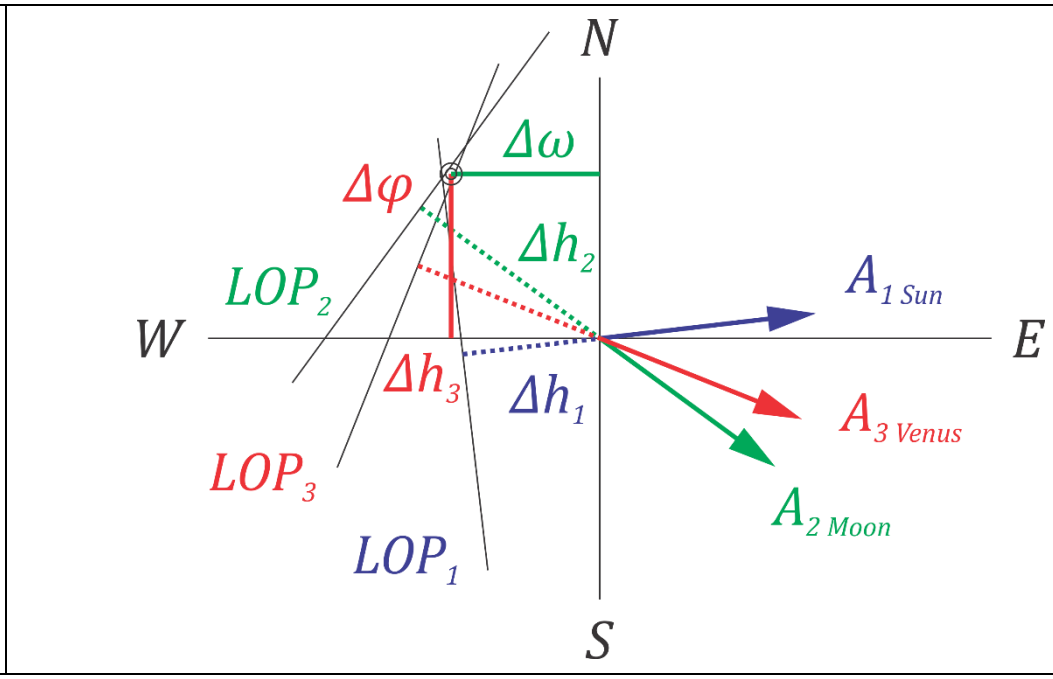
$\boldsymbol{\sin h = \sin\varphi \cdot \sin\delta + \cos\varphi \cdot \cos\delta \cdot \cos t}$
$\boldsymbol{A = arcsin\dfrac{sin(90° - \delta) \cdot sint}{cosh}}$ $\boldsymbol{A = arctg\dfrac{sint}{ctg(90° - \delta) \cdot sin(90° - \varphi) - cos(90° - \varphi) \cdot cost}}$ $\boldsymbol{A = arccos\dfrac{cos(90° - \delta) - cos(90° - \varphi) \cdot cos(90° - h)}{sin(90° - \varphi) \cdot sin(90° - h)}}$

Objects	1 – The Sun	2 – The Moon	3 – Venus
h	22° 15.5′	45° 20.0′	44° 28.3′
A	83.4°	126.2°	111.8°

Step 4:

The Sun	⊙	**The Moon**		**Venus**	
Sextant index	22° 13.3′	*Sextant index*	44° 37.5′	*Sextant index*	44° 40.4′
$(i+S)'$	−0.1′	$(i+S)'$	−0.1′	$(i+S)'$	−0.1′
$-\Delta h_d$ *(DIP)*	−8.8′	$-\Delta h_d$ *(DIP)*	−8.8′	$-\Delta h_d$ *(DIP)*	−8.8′
⇒ h_B *(App. Alt.)*	22° 04.4′	⇒ h_B *(App. Alt.)*	44° 28.6′	⇒ h_B *(App. Alt.)*	44° 31.5′
→ Δh_ρ *(Ref.)*	−8.1′	→ Δh_ρ *(Ref.)*	−7.7′	→ Δh_ρ *(Ref.)*	−7.7′
Δh_p *(PA)*	+0.13′	Δh_p *(PA)*	+39.1′(54.8′)	Δh_p *(PA)*	
$R_\odot$ *(SD)*	+15.9′	R_{Moon} *(SD)*	+14.9′		
⇒ $h_{Corrected}$	22° 12.33′	⇒ $h_{Corrected}$	45° 14.9′	⇒ $h_{Corrected}$	44° 23.8′
$-h_{Calculated}$	−22° 15.5′	$-h_{Calculated}$	−45° 20.0′	$-h_{Calculated}$	−44° 28.3′
⇒ Δh	−3.17′	⇒ Δh	−5.10′	⇒ Δh	−4.50′

Step 5:

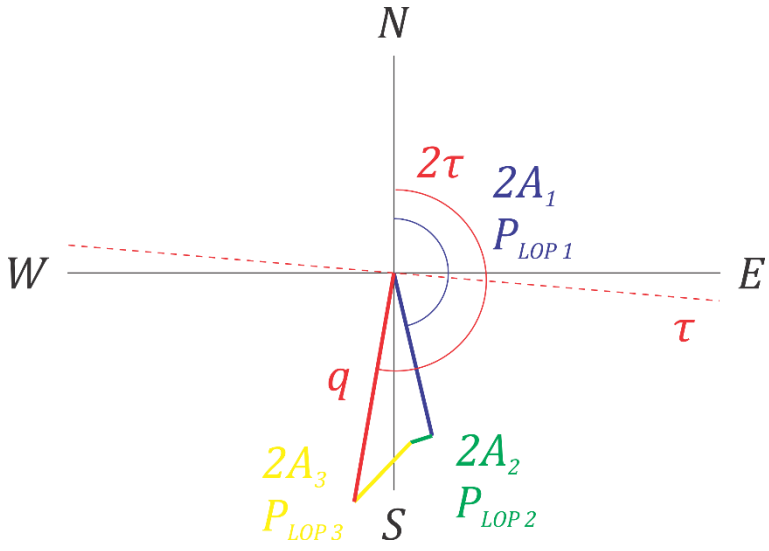
Graphical solution	

Result	$\Delta\varphi = +3.7803'$ $\Delta\lambda = \frac{\Delta\omega}{\cos\varphi_{DR\,3}} = \frac{-3.4173}{\cos(25°\,38.0')} \approx -3.7903'$

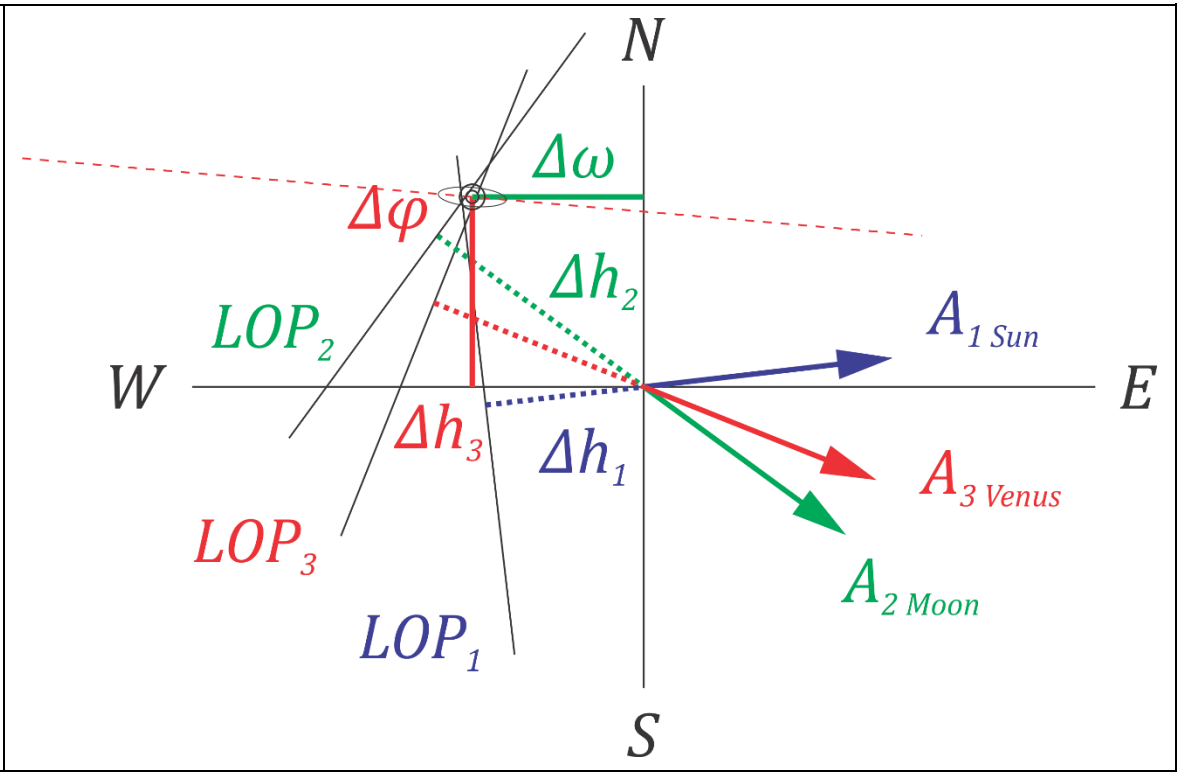
$\varphi_{DR\,3}$	$25°\,38.0'\ N$	$\lambda_{DR\,3}$	$087°\,51.3'\ W$
$\Delta\varphi$	$+3.7803'$	$\Delta\lambda$	$-3.7903'$
$\boldsymbol{\varphi_{Obs}}$	$\mathbf{25°\,41.7803'\ N}$	$\boldsymbol{\lambda_{Obs}}$	$\mathbf{089°\,47.5097'\ W}$
φ_{GPS} 08.19.24	$25°\,38.8'\ N$	λ_{GPS} 08.19.24	$087°\,53.5'\ W$

Step 6: Accuracy evaluation

LOP	*A*	Point	ΔA	$P_{LOP} = 10 \cdot (\sin\Delta A)^2$	$2A$
1	83.4°	*1-2*	42.8°	$P_{LOP\,1} = 4.616$	166.8°
2	126.2°	2-3	14.4°	$P_{LOP\,2} = 0.618$	252.4°
3	111.8°	1-3	28.4°	$P_{LOP\,3} = 2.262$	223.6°

Graphical solution	

$P_{max} + P_{min} = \sum P_{LOP\,i} = 7.496$	$P_{max} = 6.9546$
$P_{max} - P_{min} = q = 6.4132$	$P_{min} = 0.5414$
$a = \pm\frac{1}{\sqrt{P_{min}}} = \pm\frac{1}{\sqrt{0.5414}} = \pm 1.3591'$	$b = \pm\frac{1}{\sqrt{P_{max}}} = \pm\frac{1}{\sqrt{6.9546}} = \pm 0.3792'$
$2\tau = 189.8°$	$\tau = 94.9°$

Graphical solution	

2.8 SUNRISE, SUNSET, CULMINATION, TWILIGHTS

Расчёт моментов восхода, захода, кульминации Солнца, Луны и Венеры, моментов начала и конца навигационных сумерек

SUNRISE AND SUNSET

Date	26.04.2019	φ_{GPS}	$28°\ 53.4'\ N$
$LT = UTC \pm i$	20.18.08 (UTC -5)	λ_{GPS}	$089°\ 20.5'\ W$
	$\underline{\odot}\uparrow$	$\underline{\odot}\downarrow$	
$T_{Almanac}$	05.34	18.22	
$\Delta_{Daily} = \frac{\Delta_{3\ days}}{3}$	$(-00.02/3)$	$(+00.01/3)$	
$\Rightarrow T'_{Almanac}$	05.34	18.22	
ΔT_{φ}	$-00.10.40$	$+00.10.40$	
ΔT_{λ}	$-00.00.10$	$-00.00.05$	E – previous, W – next
$\Rightarrow T_{LT}$			
$-(\pm \lambda^E_W) = \mp \lambda^E_W$	$+05.57.22$	$+05.57.22$	
$\Rightarrow T_{UTC}$	11.20.32	00.29.57	
$\pm N^E_W = \pm i$			
$\Rightarrow T_S$	06.20.32	19.29.57	

MOONRISE AND MOONSET

Date	26.04.2019	φ_{GPS}	$28° 53.4' N$
$LT = UTC \pm i$	20.18.08 (UTC -5)	λ_{GPS}	$089° 20.5' W$
	☾↑	☾↓	
$T_{Almanac}$	00.08	11.25	
ΔT_{φ}	+00.17.47	−00.17.47	
ΔT_{λ}	+00.11.25	+00.12.39	E – previous, W – next
$\Rightarrow T_{LT}$			
$-(\pm \lambda_W^E) = \mp \lambda_W^E$	+05.57.22	+05.57.22	
$\Rightarrow T_{UTC}$	06.34.34	17.17.17	
$\pm N_W^E = \pm i$			
$\Rightarrow T_S$	01.34.34	12.17.17	

TWILIGHTS

Date	26.04.2019	φ_{GPS}	$28° 53.4' N$
$LT = UTC \pm i$	20.18.08 (UTC -5)	λ_{GPS}	$089° 20.5' W$
	☉↑	☉↓	
$T_{Almanac}$	04.45	19.11	
ΔT_{φ}	−00.16.00	+00.16.00	
$\Rightarrow T_{LT}$			
$-(\pm \lambda_W^E) = \mp \lambda_W^E$	+05.57.22	+05.57.22	
$\Rightarrow T_{UTC}$	10.26.22	01.24.22	
$\pm N_W^E = \pm i$			
$\Rightarrow T_S$	05.26.22	20.24.22	

MERIDIAN PASSAGE OF THE SUN AND THE MOON

Date	26.04.2019	φ_{GPS}	$28° 53.4' N$
$LT = UTC \pm i$	20.18.08 (UTC -5)	λ_{GPS}	$089° 20.5' W$
	⊙	○	
$T_{Almanac}$	11.58		
ΔT_λ	00.00.00		E – previous, W – next
$\Rightarrow T_{LT}$			
$-(\pm \lambda_W^E) = \mp \lambda_W^E$	+05.57.22		
$\Rightarrow T_{UTC}$	17.55.22		
$\pm N_W^E = \pm i$			
$\Rightarrow T_S$	12.55.22		

MERIDIAN PASSAGE OF PLANETS (VENUS, MARS, JUPITER, SATURN)

Date	26.04.2019	φ_{GPS}	$28° 53.4' N$
$LT = UTC \pm i$	20.18.08 (UTC -5)	λ_{GPS}	$089° 20.5' W$
	Venus	Mars	
$T_{Almanac}$	10.12	14.47	
$\Delta_{Daily} = \frac{\Delta_{3\ days}}{3}$	(+00.01/3)	(−00.03/3)	
$\Rightarrow T'_{Almanac}$	10.12	14.47	
ΔT_λ	+00.00.05	+00.00.15	E – previous, W – next
$\Rightarrow T_{LT}$			
$-(\pm \lambda_W^E) = \mp \lambda_W^E$	+05.57.22	+05.57.22	
$\Rightarrow T_{UTC}$	16.09.27	20.44.37	
$\pm N_W^E = \pm i$			
$\Rightarrow T_S$	11.09.27	15.44.37	

2.9 DEFENSE QUESTIONS

Собеседование

1. Выверка и определение поправки индекса секстана

   Sextant

2. Серии измеренных высот светил и расчёт СКП

   Root mean square error

3. Определение поправки хронометра; всемирное координированное время

   Chronometer error

4. Использование звёздного глобуса для планирования наблюдений и опознавания светил

   Star finder

5. Расчёты восхода (захода), кульминации светил, начала и конца навигационных сумерек

   Sunrise, sunset, culmination, twilights

6. Анализ и оценка точности астрономических обсерваций

   Accuracy evaluation

3 SHIP HANDLING AND MANOEUVRING

УПРАВЛЕНИЕ СУДНОМ

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3.1 ASSESSMENT AND REMARKS

Отчетность по разделам программы практики с краткими выводами

Разделы / Sections	**Оценка** / Mark
Знание устройства судна и морской терминологии на английском языке *Knowledge of vessel's devices and marine terminology*	
Знание процедур вахтенной службы. Несение ходовой и стояночной вахты. *Knowledge of watchkeeping procedures. Carrying out bridge and port watchkeeping.*	
Несение надлежащего визуального и слухового наблюдения *Keeping a proper look-out by sight and hearing*	
Умение управления рулем и понимания команд, подаваемых на руль, на русском и английском языках *Ability to steer the ship and understand helm orders, in Russian and English languages*	
Знание и выполнение обязанностей при проведении учебных тревог *Knowledge and performance of duties during training emergency drills*	
Умение использовать аварийно-спасательные средства судна *Ability to operate life-saving appliance*	
Умение пользоваться радиолокатором, расшифровывать и анализировать полученную информацию *Ability to operate radar/ARPA and use of radar information*	
Знание и умение пользоваться приборами на ходовом мостике. Знать процедуру их калибрования. *Knowledge and ability to operate and adjust bridge equipment*	
Знание мер предосторожности для предотвращения загрязнения моря и воздуха с судна (MARPOL) *Knowledge of the precautions to prevent pollution of the sea (MARPOL)*	
Участие в швартовых операциях судна *Participation in the ship mooring operations*	
Участие при постановке и съемке судна с якоря *Participation in anchoring and weighing anchor*	
Участие в грузовых операциях судна *Participation in cargo operations*	
Участие в техническом обслуживании и ремонту на судне *Participation in the maintenance and repair of the ship*	
Уживчивость в коллективе *Livable in the team*	
Знание английского языка и умение его использования в профессиональной деятельности *Knowledge of English and the ability to use it in professional activity*	

* ***Шкала оценок: пятибальная*** */ Rating scale: five-point*

Выводы капитана (старшего помощника): / Conclusions of Master (Chief Officer):

.....

.....

.....

Судовая печать и дата
Ship's Stamp and Date

Капитан / Master
Подпись / Signature

VITULESCU DOREL
Фамилия. И.О. (ПЕЧАТНЫМИ буквами) / Name (in BLOCK letters)

3.2 GENERAL INFORMATION

Данные о судне и рейсе

3.2.1 SHIP'S CHARACTERISTICS

Тактико-технические характеристики судна

General

Ship name	ARUBABORG
Call sign	PCCY
IMO number	9466295
Port of registry	Delfzijl, The Netherlands
Flag	Dutch
Built	2010
Shipyard	Hudong-Zhonghua Shipbuilding Group Co. Ltd.
Classification	Lloyds Register of Shipping
Class notations	+100A1 + LMC UM NAV1, Ice class A1, IWS LI
Ice class	Finnish/ Swedish 1A (Ice belt zone: 4.900 – 9.895 m)
P&I Club	North of England P&I Association

Main particulars

DWAT	17 300 mt
Length over all	143.00 m
Breadth over all	21.50 m
Drafts	Summer – 9.690 m (SSW), Tropical – 9.909 m, Winter – 9.505 m
TPC (SSW)	27.9 mt/cm
Air draft (in Ballast)	35.40 m
Depth (moulded)	13.30 m

Distance WL-HC in ballast	~ 10.50 m
GT	11 864
NT	5 650

Cargo Capacities

Total cubic feet capacity	707 633 grain/ bale (tweendeck pontoons stored on deck) 655 924 grain/ bale (tweendeck pontoons stored in holds)
Cubic capacity Hold No. 1	269 401 cbft (tweendeck pontoons stored on deck)
Cubic capacity Hold No. 2	438 232 cbft (tweendeck pontoons stored on deck)

Holds/ Hatches

2 Holds/ 2 Hatches	Both types are Fully open-hatch – no under-stow Fully box and double skinned Fully square – except box structures due to vessel's outer shape Macgregor Navire hydraulic steel pontoon hatches Both holds fitted with dehumidifier system
Dimensions	Hold No. 1 – 35.80 x 17.75 x 13.50 Hold No. 2 – 52.10 x 17.75 x 13.50

Tweendecks

Tweendeck sizes	The vessel is equipped with a full tweendeck, consisting of loose tweendeck pontoons of each: No. 1: 9.90 m x 3.22 m x 0.90 m weight ~ 6 tons No. 2 – 3: 12.57 m x 6.48 m x 0.90 m weight ~ 25 tons No. 4 – 14: 17.65 m x 6.48 m x 0.90 m weight ~ 33 tons Tweendecks can be used as vertical bulkheads at every 20 ft interval
Strengths	Max pressure tank-top – 20.00 mt/ sqm Max pressure tweendeck – 4.00 mt /sqm Max pressure weather-deck – 1.75 mt / sqm

Cargo Cranes

3 cranes	Fixed on portside. The cranes can be combined to up to 120 mts but not the entire holds/ hatches can be served with this maximum lifting capacity. Free distance between the cranes is 31 meters. Vessel fitted with lifting beam (weight about 10 tons).

Hoisting speed	With a capacity of 40 mts SWL at a reach of up to 28 m: Reeving: 2 – fall SWL: 0 – 22 m/min Empty hook: 0 – 35 m/min With a capacity of 60 mts SWL at a reach of up to 16 m: Reeving: 3 – fall SWL: 0 – 14 m/min Empty hook: 0 – 23 m/min

Tank Capacities

HFO	1 450 m^3
MGO	215 m^3
Water ballast capacity	5 490 m^3
Fresh water	280 m^3

Consumption

Underway	14.0 knots – 20 mts/day 14.5 knots – 21 mts/day 15.0 knots – 23 mts/day These figures are about and based on 7.60 m draft, clean bottom, even keel, deep and current less waters, calm sea and max wind force Beaufort 2/ Douglas 2 and maximum sea temperature 28 / 29 degrees Celsius, and shaft generator connected.
In port	Gear working: 3.0 mts MGO Idle: 1.4 mts MGO For maneuvering and navigation in port/ narrow water vessel burns MGO.

Engines

Main Engine	1 x Wärtsilä 6L46F, 7 500 kW at 500 rpm
Reduction Gear	1 x Flender, GCSP 1115
Propeller	Wärtsilä/Lips, 4 blades, 4 800 mm
Bow Thruster	750 kW

3.2.2 WHEELHOUSE POSTER

Таблица маневренных элементов судна (можно фото, ксерокс) – назначение, содержание, умение пользоваться представленной информацией

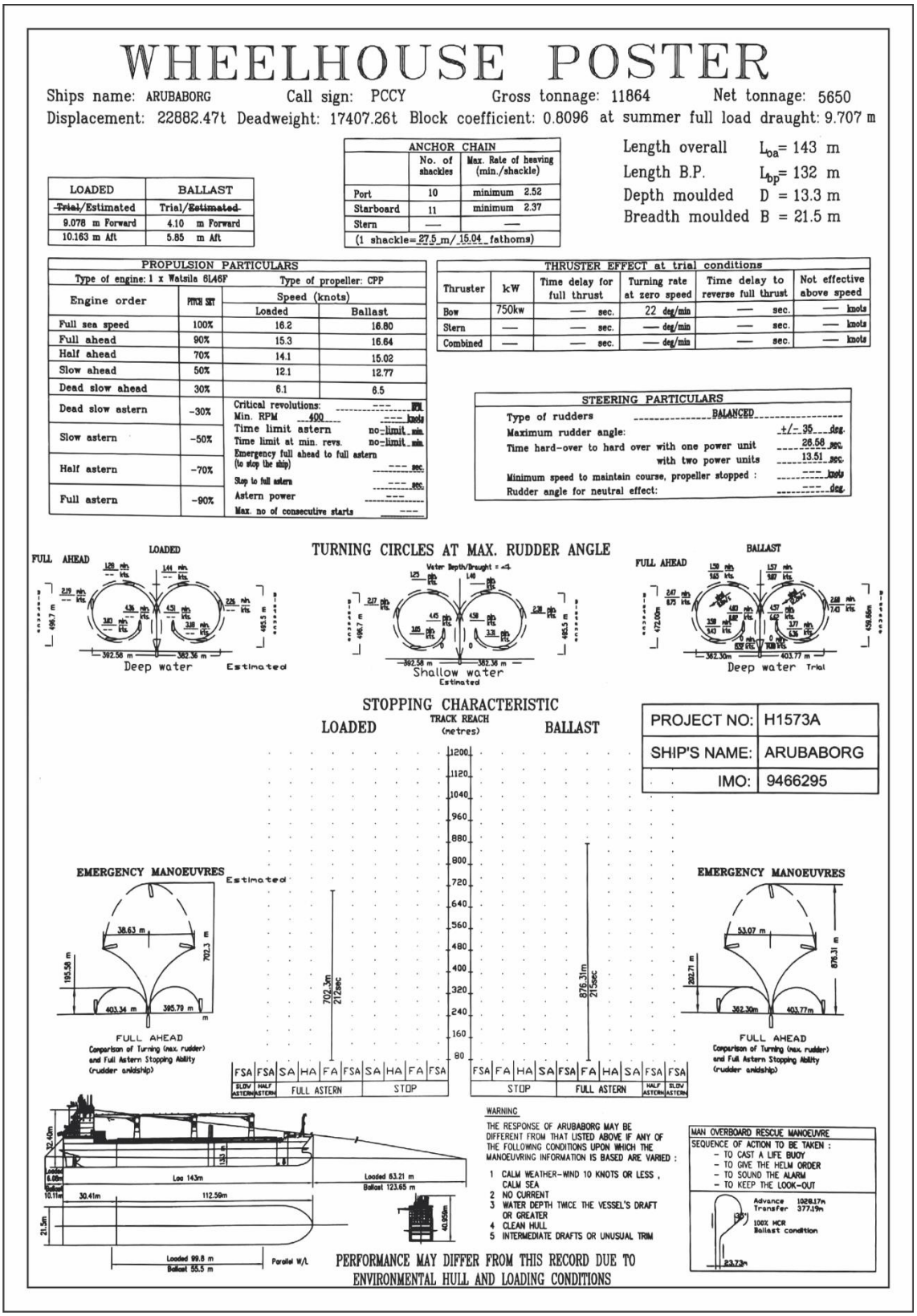


Figure 3.2.2.1. The wheelhouse poster [3.2]

3.2.3 CHARTERING, VOYAGE AND CARGO INFORMATION

Рейсовое задание (чартер партия). Направление рейсов, их сроки. Виды перевозимых грузов.

No.	Charterer	Voyage	Cargo
1	Wagenborg	Sheerness – Dunkirk – Antwerp	Ballast
2	Hugo Stinnes	Antwerp – Bremen – Wilmington, NC – Veracruz – Altamira	Project cargoes, Steel coils, Steel plates, Containers
3	Hugo Stinnes	Altamira – Chalmette (New Orleans) – Port Everglades – St. John's (Antigua) – Southampton – Ghent	Pet cokes, Project cargoes, Yachts

3.3 SHIPBOARD FAMILIARIZATION

Ознакомление с судном

3.3.1 EMERGENCY SCHEDULES

Сигналы судовых тревог. Содержание расписания по тревогам (Личная карточка).

WAGENBORG SHIPPING

EMERGENCY SCHEDULES A-SERIES

ABANDON SHIP

Abandon ship • • • • • • • ———

Note
Alarms only be sounded by, or with specific orders from the Master or his substitute.
No FFB/ life-rafts to be lowered without specific orders from the Master or his substitute.
Put on warm clothing and do not panic.
Wear no shoes in immersion suits, short people wearing an immersion suit should wear belt and neck-string in accordance with instructions.
Passengers and additional crew report to the muster station.

RANK	ABANDON SHIP DUTIES
Master	General command, internal/external communications
Ch. Officer	2nd in command, VHF, SART, FFB launching and manoeuvring
2nd Officer	EPIRB, VHF
3rd Officer*	Assist as directed
Ch. Engineer	FFB engine, VHF
2nd Engineer	Assists Ch. Engineer (substitute C/E if necessary)
3rd Engineer*	Assist as directed
Cook*	Provisions and blankets
Bosun	Removes lashings, lowers embarkation ladder
Sailor	Assists Bosun
Sailor	Assists Bosun
Sailor	Assists Cook
Fitter*	Assists C/E
Appr. Deck*	Assists Ch. Officer
Appr. ER*	Assists Ch. Engineer

* If on board

FFB lowering procedure
1. Remove lashing
2. Embark into the FFB
3. Properly stow lifejackets/ helmets
4. Check if everybody is secured properly
5. Start engine
6. Release FFB

Embarkation procedure into life-rafts
1. Lower embarkation ladders
2. Check painter and steering lines are connected to the vessels
3. Lift the raft and turn overboard
4. Pull the painter line totally out of the container and inflate the raft by giving a short jerk on the painter line, pull raft alongside with steering and bowsing lines
5. All persons embark into the raft, crane to be operated from inside the raft
6. After embarkation, release all lines, except painter line, lower raft with remove control
7. Release the raft from the crane, cut the painter line
8. When free from ship, use sea anchor, start taking seasickness pills

FIRE

Fire ———————————

Note
Alarms only be sounded by, or with specific orders from the Master or his substitute.
Do not panic, stop with your work but leave it behind in a safe manner.
Passengers and additional crew report to the muster station.

TEAM	RANK	FIRE-FIGHTING DUTIES
Bridge	Master	General command, internal/external communications
	Ch. Officer	On-scene commander deck, VHF (substitute Master if necessary)
Team 1	2nd Officer	Fireman's outfit including BA-set, hose-man**
	2nd Engineer	Fireman's outfit including BA-set, VHF**
Team 2	3rd Officer*	Fireman's outfit including BA-set, hose-man**
	3rd Engineer*	Fireman's outfit including BA-set, VHF**
	Cook	Medical equipment
	Bosun	Closing party and prepares fire-fighting equipment
	Sailor	Closing party and prepares fire-fighting equipment
	Sailor	Closing party and prepares fire-fighting equipment
	Sailor	Closing party and prepares fire-fighting equipment
	Apprentices*	Assist as directed
Engine control room	Ch. Engineer	On-scene commander ER, VHF
	Fitter*	Assists Ch. Engineer

* If on board
** Hose-man/ VHF duty may exchange due to location of the fire (ER or Deck)

Closing party
1. Close all designated doors
2. Close dampers as requested
3. Close fire dampers as requested
4. Report to Chief Officer

Standard orders in case of fire
1. Upon detecting a fire, report to the bridge or activate alarm at manual calling point
2. If possible, close doors and leave the area
3. Officer on duty informs the Master and switches off ventilation as needed
4. Upon hearing a fire alarm, crew reports to the muster station
5. CO2 only to be released at the Master's instruction by an appointed crewmember
6. When releasing CO2 from the CO2 room, use BA-set

RECOVERY OF PERSONS FROM THE WATER

Recovery of persons from the water ——— ——— ———

Note
Alarms only be sounded by, or with specific orders from the Master or his substitute.
No rescue boat to be lowered without specific orders from the Master or his substitute.
Rescue boat crew puts on warm clothing and do not panic.
Wear no shoes in immersion suits, short people wearing an immersion suit should wear belt and neck-string in accordance with instructions.
Passengers and additional crew report to the muster station.

RANK	RECOVERY DUTIES
Master	General command, internal/external communications
Ch. Officer	Rescue boat crew, VHF, SART
2nd Officer	Assists Master on the bridge
3rd Officer*	Assist as directed
Ch. Engineer	Prepares stand-by ER
2nd Engineer	Rescue boat crew, prepares rescue boat engine
3rd Engineer*	Assist as directed
Cook*	Stretcher, medical equipment and blankets
Bosun	Rescue boat crew
Sailor	Removes lashings, lowers embarkation ladder
Sailor	Removes lashings, lowers embarkation ladder
Sailor	Assists Cook
Fitter*	Assists C/E
Appr. Deck*	Assist as directed
Appr. ER*	Assist as directed

* If on board

Man overboard procedure
1. Release lifebuoy with light and smoke on the side the crewmember has fallen overboard
2. Activate GPS MOB-marker
3. Sound 3 long blasts on the general alarm and/or ship's whistle
4. Post look-out with binoculars and instruct to maintain a continuous look-out on the man overboard
5. Commence a recovery manoeuvre, such as Anderson, Williamson or Scharnow turn
6. Inform the Master, if not already on the bridge, and engine room
7. Prepare rescue boat for possible launching, consider alternative means of man overboard recovery if launch/ recovery of rescue boat considered to be of excessive risk
8. Distribute VHFs
9. Rig pilot ladder/ nets/ lower gangway/ release floating materials to assist in the recovery
10. Broadcast urgency message to ships in vicinity, use GMDSS equipment

Remarks
- Every crewmember with assigned emergency duties shall be familiar with these duties before the voyage begins.
- This list is to be posted in easily visible places on board, including bridge, engine room, each deck and crew's accommodation.
- The Master is the assigned person in relation to passengers in case of emergency.
- Safety officer is assigned to ensure that life-saving and fire appliances are maintained in good condition and are ready for immediate use.
- Communication: VHF Channels 15, 17, or 6, which is free for use as inter-ship.
- For details regarding operating of life-saving appliances please refer to SOLAS Training Manual on the bridge and/or in the messroom.
- In case of fire, a closing party will close fire dampers/ ventilation covers on the Master's orders only. Please refer to Chapter 3.2 Emergency preparedness in SOM for detailed list.
- Crew/ passengers without any tasks may be divided by the Master as needed in case of others being disable,

Figure 3.3.1.1. The emergency schedules [3.3]

3.3.2 SAFETY AND FIRE CONTROL PLAN

Схема расположения спасательных средств и их вместимость, оборудование удаленного места. Схема расположения станции тушения пожара, маркировка помещений систем и оборудования, система оповещения на ходовом мостике. Схема расположения аварийно-спасательного имущества, маркировка помещений систем и оборудования. Маркировка помещений, устройств и механизмов. Значения IMO наклеек.

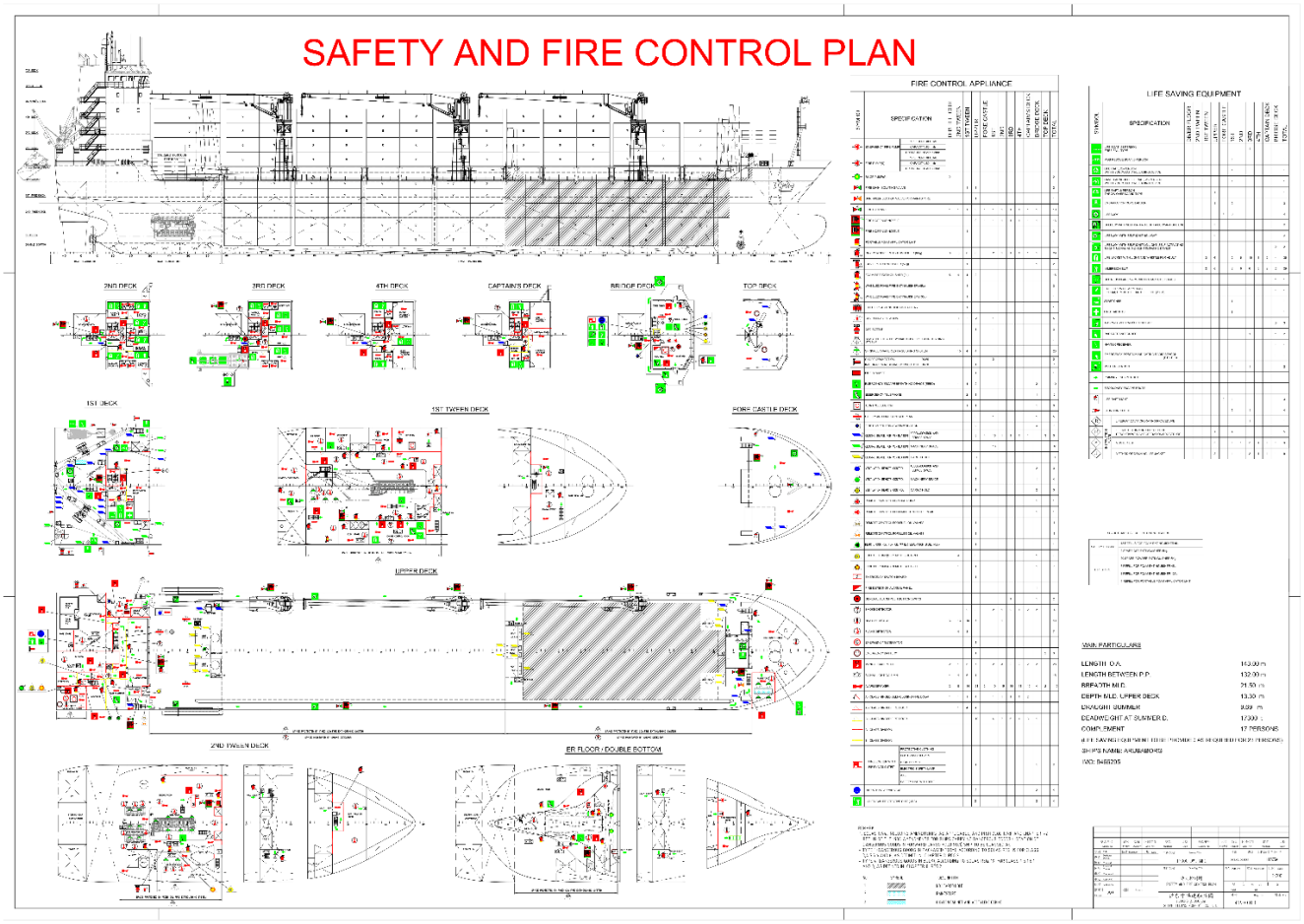


Figure 3.3.2.1. The safety and fire control plan [3.3]

3.4 WATCHKEEPING ORGANIZATION

Организация вахтенной службы

3.4.1 BRIDGE FAMILIARIZATION

Ознакомление с ходовым мостиком. Схема или фото расположения приборов управления судном.

Figure 3.4.1.1. The bridge of MV Arubaborg [3.4]

Reference: 1.1 Bridge arrangement drawing

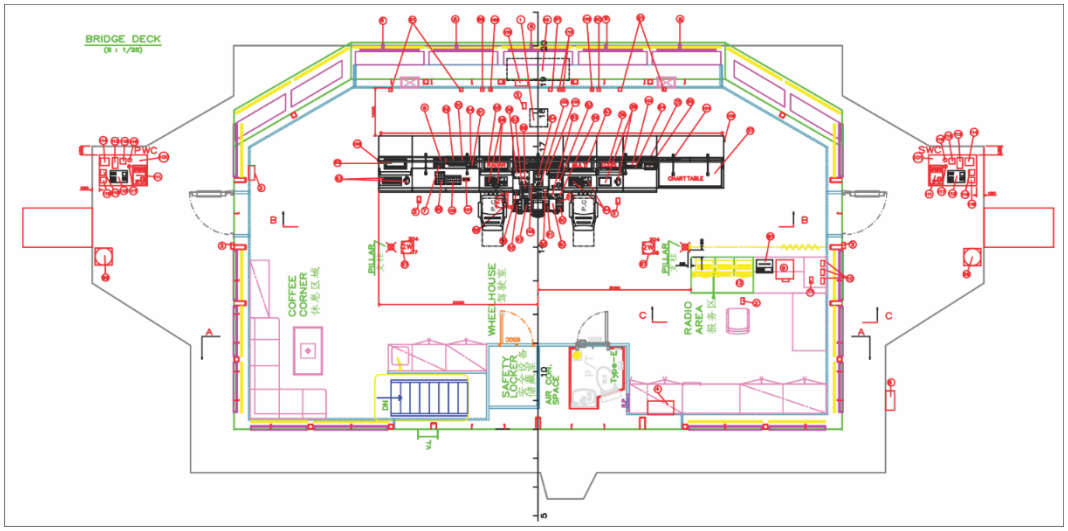


Figure 3.4.1.2. Arrangement of wheelhouse, chart and radio space [3.4]

3.4.2 WATCHKEEPING (UNDERWAY)

Процедуры приема и сдачи навигационной вахты на ходу судна (все действия по пунктам)

SOM PART 13.5

Handing over the watch

Officer coming on watch	Officer going off watch
▪ Read and sign the bridge watch book ▪ Take note of the vessel's position, speed and course. ▪ Examine the voyage plan and ECDIS to identify relevant lights or objects expected to be sighted during the watch. ▪ Check gyro compass against magnetic compass. ▪ Before taking over, obtain a clear understanding from the officer being relieved concerning lights, objects and vessels in sight and on radar display. ▪ Ask for any verbal orders, instructions or unusual circumstances. ▪ Formally relieve the watch by verbal exchange of gyro course and engine load. ▪ If a manoeuvre or change of course to be carried out during change of watch, relieve shall not be undertaken before the vessel has cleared or the new course is steadily reached.	▪ No relief if any doubts about fitness of relieving officer to fulfil his duties, the master has to be informed immediately. ▪ After formally relieved, he shall write up and sign the logbook.

During the watch

Officer on watch
▪ No officer is allowed to change the course or speed set by the master except to meet the rules of the road or in any emergency. The master must be informed as soon as practicable if course and speed are changed in an emergency. ▪ In restricted visibility of fog, inform master. Set a safe speed as necessary and always in compliance with COLREG. ▪ The vessel's position is to be fixed by visual bearings as possible. The time of the fix, distance off shall be noted in the log. Check each fix with the GPS in at least hourly intervals. ▪ A watch officer must not leave the bridge without relief. ▪ Unusual or unexpected occurrences shall be reported to the master immediately.

3.4.3 WATCHKEEPING (NOT UNDERWAY)

Процедуры приема и сдачи вахты при стоянке судна у причала и на якоре (все действия по пунктам). Оборудование, контроль и требования, предъявляемые к вахте у трапа.

WATCHKEEPING IN PORT

SOM PART 13.5	☑
The minimum requirements for watch keeping personnel depend on the size of the ship, the propulsion power, ISPS-requirements and the cargo on board. The minimum crew on board when the vessel is engaged in cargo or other operations shall include a deck officer and an engineer. It is at the Master's discretion to increase the number of officers or sailors on duty when he considers this necessary in the given circumstances. The minimum crew on board when the vessel is not in operation shall include either: ▪ A deck officer and an engineer. ▪ A deck officer who is familiarized in the engine room and a second person.	
At least one of the persons on duty is able to:	
▪ Ensure the vessel is properly moored at all times	☐
▪ Give water on deck (e.g. in case of fire)	☐
▪ Operate the bilge pump	☐
▪ Start a generator and give electric power on deck	☐
▪ Enter all spaces on board (with general master keys)	☐
▪ Alert the port authorities in case of an emergency	☐

RUSSIAN RONS-89	☑
When taking over and keeping a harbour watch, the watch officer shall:	
Together with the relieved officer carry out rounds on board to check: internal spaces and main deck, securing of mooring ropes, correct fitting of anti-rat shields and protective shields covering drains, hoisting of necessary flags and signals, gangway state and cargo operation process.	☐
Besides, he receives instructions and orders concerning the watch.	☐
Provide necessary information for the gangway watch board.	☐
Keep observation of draft, proper securing and condition of mooring ropes, fenders, adherence to local rules.	☐
Keep observation of the ladder or gangway state, of compliance of them and their equipment with the safety code regulations.	☐

Attend the change-over of the watch at the gangway, instruct the relieving seamen.	☐
Supervise the admission of the extraneous persons to the vessel.	☐
Act so as not to allow the ship to list while cargo operation is in progress.	☐
Supervise loading in accordance with the authorized cargo plan, correctness of using ship's cargo handling equipment.	☐
Provide timely opening/ closing of hatches of holds.	☐
Supervise the state of seals on sealed-up holds and rooms.	☐
Make periodic rounds and surveys on board including ship's spaces.	☐
Monitor the level of water in draining bilges.	☐
Supervise repair jobs and ensure the compliance with the fire code regulations during these jobs.	☐
Ensure due preparation of the ship for re-mooring and refastening.	☐
Raise the general emergency alarm, in absence of the master and chief mate, be in charge of damage control actions in emergency situation on board, on coast or on an adjacent vessel.	☐
Supervise and ensure the ship work involving the preparation of the ship for sea.	☐
When berthing in a harbour protected from wind and from rough sea, after receiving a storm warning, the watch service shall:	
Enhance the preparedness for sea of the main engine and vessel as a whole.	☐
Check and tighten mooring lines, add extra ropes, if necessary, install additional fenders.	☐
Check and prepare anchor gear for operation.	☐
Check and prepare a draining and pumping system for operation.	☐
Switch on a VHF radio-station for on-duty reception and establish continuous listening.	☐
Arrange hourly meteorological observation.	☐
Check fire and sprinkler extinguishing systems (with dangerous good on board).	☐
When the wind is freshening up to the strong one, the cargo operations are usually stopped, and the ship is preparing for sea.	
When the ship is berthed in a harbour exposed to wind and rough sea, the watch service shall take steps to summon all crew members on board, shall carry out cargo operation with a view to provide promptly readiness of the ship for sea. The delay in ship's departure can result in emergency.	

WATCHKEEPING AT ANCHOR

RUSSIAN RONS-89	☑
The officer of the watch, while the ship is anchoring, shall:	
Inform the watch engineer in advance, check communications with the engine room, synchronize the bridge clock and the engine room clock.	☐
Estimate ship's position and transfer the dead reckoning onto a large-scale chart.	☐
Switch on an echo sounder, withdraw the sliding sensor of the log.	☐
Establish a VHF radio-station on the appropriate channel.	☐
Establish, if specified by local regulations, communications with authorities or with a VTS service, verify time and place of anchoring, a VHF radio-communication channel (while at anchor).	☐
Send the Boatswain to the forecastle to prepare the anchor gear for using, check communications with the forecastle.	☐
Check and prepare for using the light and sound signal systems, additional aids required by local regulations.	☐
Change over to manual steering.	☐
After anchoring – estimate a ship's position, notify the watch engineer of the main engine preparedness carried out according to master's instructions, measure depths under keel, decide on control coastal landmarks, estimate and plot on the chart a circle of the ship's probable position, with the length of the paid-out chain and the ship's length overall being taken into account.	☐
While at anchor, the officer of the watch shall:	
Provide supervision of the ship's craft launched and of other crafts launched and lying alongside of the ship, arrange communication with them.	☐
Supervise the process of cargo operations at the road.	☐
Make a control fixing of the ship's position at the end of the watch (or during the watch, if necessary).	☐
Arrange continuous observation of weather conditions, environmental conditions, other vessels, absence of drift of the vessel.	☐
Check systematically depth under keel, the state of the anchor, the tension of the anchor cable, reliable fastening of the stoppers, absence of a spontaneous running-out of the cable, with tidal phenomena taken into account.	☐
When the wind is freshening, anchor cables are usually paid-out. In doing so one should visualize the length of time for hauling in the anchors in order not to let the ship drift to a danger while it is weighing anchors.	

3.4.4 SHIP SECURITY. ISPS CODE.

Меры, предпринимаемые на судне для его охраны, согласно кодексу ОСПС. Формат сообщения и сроки.

No.	**Equipment**	☑
1	Ship visitor log book	☐
2	Visitor badges	☐
3	ISPS board	☐
4	Security level board	☐
5	Padlocks	☐
6	Ship Security Plan	☐
7	Chains, wires	☐

3.4.5 RESTRICTED WEATHER CONDITION

Действия вахтенного помощника при ухудшении погодных условий (чек-лист)

RESTRICTED VISIBILITY

RUSSIAN RONS-89	☑
During deterioration of visibility the watch officer shall:	
Arrange fog signals sending.	☐
Change over to manual steering.	☐
Inform the master and the watch engineer, check communications with the engine room, the main engine to the manoeuvring mode.	☐
Switch on the Radar and ARPA, begin radar-tracking observation.	☐
Determine ship's position, switch on the echo sounder, if shallows occur.	☐
Instruct and post a lookout with bridge communication in service.	☐
Switch on navigating lights, check that the VHF radio-station is switched on a duty channel.	☐
Check the closure of doors in watertight bulkheads.	☐
Compare the compasses indications.	☐
Compare the bridge clock against the engine room clock.	☐
Put down a mark of time on the course recorder sheet and produce the print-out of reverse data.	☐
Under instruction of the master – call the watch off duty navigators to the bridge with a view to strengthen the watch.	☐

STRONG WIND AND HEAVY WEATHER

RUSSIAN RONS-89	☑
The watch officer, while the ship is being prepared for navigation in storm conditions (after receiving a storm warning signal and after the wind and sea become stronger), shall:	
Inform in advance the watch engineer and change over the main engine to the manoeuvring mode according to the master's instruction.	☐
Notify the crew of an approaching storm, of necessary measures relevant to ship's equipment under responsibility of designated crew members and of the order of persons' movement on board the ship.	☐
Check mechanical telegraph, communication with steering and engine rooms, synchronize the bridge clock and the engine room clock.	☐
Change over to manual steering, make necessary arrangements for change-over to stand-by and emergency steering.	☐
Give instructions on: checking for reliable closure of hatches, access holes of holds, light hatches, air scuttles, fans, measuring tubes, air tubes as well as checking all water-tight closure conditions.	☐
Securing main gangways, life boats, mooring ropes, ship's property on open decks and in ship's spaces.	☐
Checking fastening and additional fastening of loads in holds and on deck.	☐
Checking reliable covering of deck devices and mechanisms.	☐
Fitting storm lines on cargo deck.	☐

3.4.6 PILOTAGE. UNDER KEEL CLEARANCE.

Действия вахтенного помощника при приеме и плавании с лоцманом (чек-лист). Вооружение лоцманского трапа (схема или фото). Расчет UKC при прохождении мелководного участка моря. Эскиз или фото карты данного района плавания (узкость, портовые воды, мелководный участок пролива).

BEFORE TAKING ON A PILOT

RUSSIAN RONS-89	☑
The officer of the watch before taking on a pilot shall:	
Mark on the chart a place assumed to board a pilot, specify the procedure of communication with the pilot.	☐
Specify the time of approaching the place of pilot transfer.	☐
With master's sanction – instruct the watch engineer to switch the main engine to the manoeuvring mode.	☐
Make synchronization of the bridge and engine room clocks.	☐
Prepare and check the communication and signal systems.	☐
Prepare flags "Golf", "Hotel", and while entering territorial waters – the national flag of the port of call and hoist it.	☐
Make preparations for anchoring, check communications with the forecastle.	☐
Turn on the second steering gear, if the joint work of two steering gears is technically possible.	☐
Change over to manual steering.	☐
Establish communication with a pilot station, specify a time of arrival and a place to take on a pilot, a ship's side to rig a ladder.	☐
Prepare a pilot ladder (hoist), handrails, accommodation ladder, life buoy with line and light, a line with karabiner to lift pilot's things on board and check illumination of the pilot ladder (hoist) and of the place of pilot's boarding.	☐
Notify the master of approaching a place to take on a pilot, hoist the flag "Golf" or other signals required by local regulations.	☐

WHILE TAKING ON A PILOT

RUSSIAN RONS-89	☑
While meeting a pilot and during pilotage, navigators shall:	
Make sure of safe fastening of pilot's ladder handrails and of accommodation ladder.	☐
Meet (together with a seaman) the pilot and take on his luggage.	☐
Conduct the pilot to the bridge, introduce the pilot to the master, write down a surname and initials of the pilot.	☐
Lower the flag "Golf", hoist the flag "Hotel".	☐
Find out from the pilot the necessity of hoisting additional flags and signals, hoist them.	☐
Provide the pilot with the information necessary to steer the vessel.	☐
Obtain from the pilot the information on the conformity of a nautical chart in use with the real situation, on conditions of navigation in the region.	☐
Duplicate orders of the pilot to the helmsman and supervise the correctness of their execution.	☐
Coordinate with the pilot the mooring plan and towing assistance, the order of sending of mooring and towing lines, and then give instructions to prepare towing cables and, if necessary, notify the forecastle, the aft and the engine room of the ship's side to be berthed.	☐
Fill in the pilot receipt.	☐
Ask the pilot about a place to disembark him and a ship's side to rig the ladder.	☐
Arrange meal with appropriate serving for the pilot.	☐
Conduct the pilot to the ladder making personally sure of its safe fastening, assist the pilot to go down.	☐

NAVIGATION WITH PILOT ON-BOARD

RUSSIAN RONS-89	☑
Navigation with pilot embarked	
The presence of a pilot on the bridge does not relieve the master or the officer of the watch of their rights and duties in relation to maintenance of the safety of navigation.	☐
At a slightest doubt in pilot's actions the master (the officer of the watch) should, as far as the time permits, find out the pilot's intentions.	☐
For each part of the route the master should understand which of the pilot's orders – turning to a hazardous direction, exceeding of the safe speed limit etc. – shall be immediately canceled, since in most cases the pilotage operations take place in restricted waters, where the clarification of the pilot's intentions may take too much time to be carried out.	☐

PILOT BOARDING ARRANGEMENT

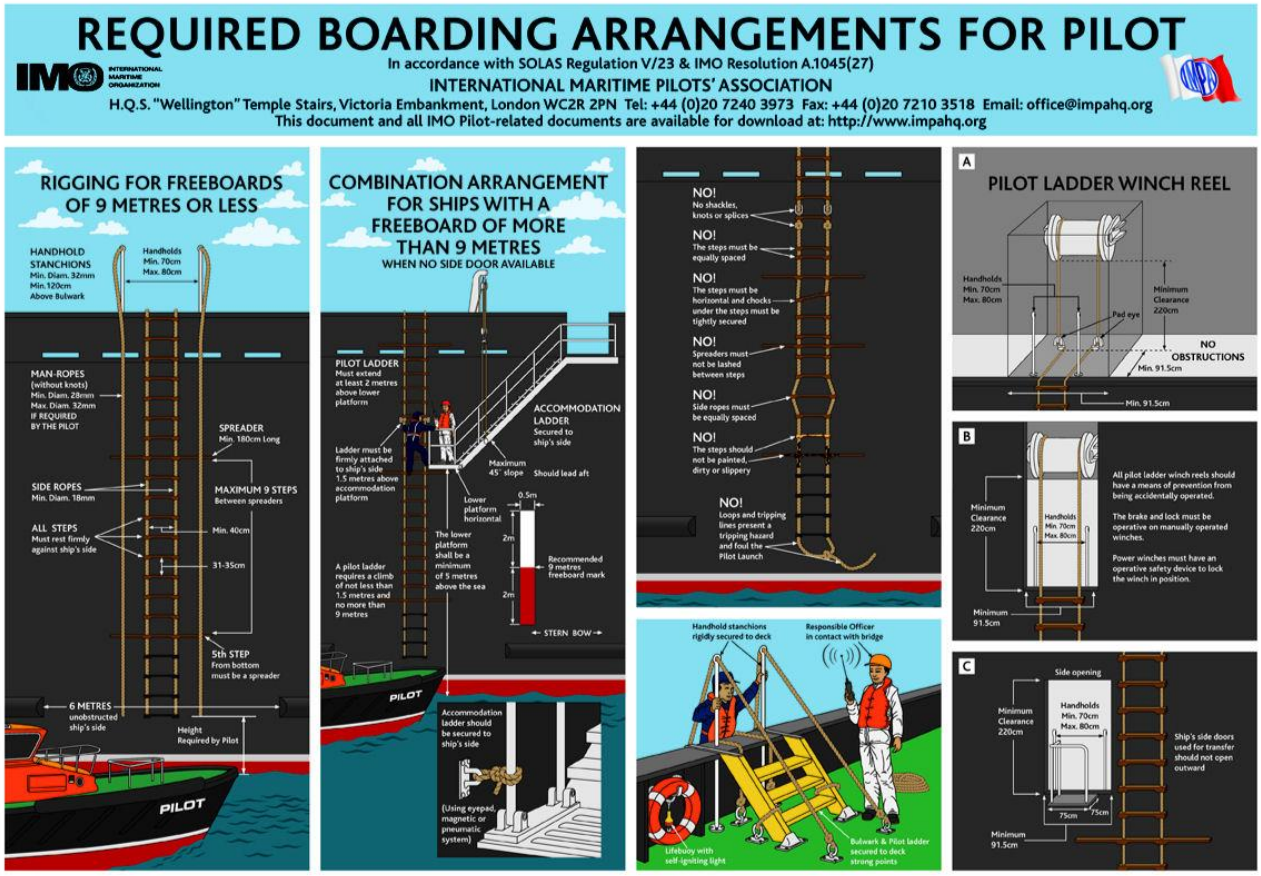


Figure 3.4.6.1. Required boarding arrangement for pilot [3.4]

UNDER KEEL CLEARANCE

$UKC = (H_h \pm \Delta H_h) - (d + \Delta d + a) \geq Z_{heel} + Z_{min} + Z_w + Z_{sq}$	
UKC	Under keel clearance
H_h	Charted depth
ΔH_h	Sea level allowance
d	Deepest draft
Δd	Draft allowance for salinity
a	Draft allowance for icing
Z_{heel}	Depth allowance for heel
Z_{min}	Minimum charted depth
Z_w	Depth allowance for wave
Z_{sq}	Depth allowance for squat

Water density, kg/m^3	**Salinity, ‰**	**$\Delta d, m$**
1025	32	$0.000 \cdot d$
1020	26	$0.004 \cdot d$
1015	20	$0.008 \cdot d$
1010	13	$0.012 \cdot d$
1005	7	$0.016 \cdot d$
1000	0	$0.020 \cdot d$

Step 1:

$C_b = \frac{\nabla}{L_{pp} \times B \times d_{mn}} = \frac{W}{\rho_w \times L_{pp} \times B \times d_{mn}}$	
C_b	Ship's block coefficient
∇	Submerged volume, m^3
W	Displacement, t
ρ_w	Water density, t/m^3
L_{pp}	Length between perpendiculars
B	Breadth
d_{mn}	Mean draft

Step 2:

$\Delta\rho_w = FWA \times \frac{1025 - \rho_w}{25}$	
$\Delta\rho_w$	Change in draft/ Adjustment due to salinity change, mm
FWA	Fresh Water Allowance, mm
ρ_w	Water density, t/m^3

Step 3:

$\frac{D}{d} = \frac{H + HoT - E}{d_{mn} + \Delta\rho_w}$	
D	Depth
d	Draft
H	Charted depth
HoT	Height of tide
E	Height of swell
d_{mn}	Mean draft
$\Delta\rho_w$	Change in draft/ Adjustment due to salinity change, mm

$S = \frac{A_s}{A_c} = \frac{B_s \times T}{B_c \times H}$	
S	Blockage factor
A_s	Immersed cross-section of the ship's amidships section
A_c	Cross-section of water within the canal or river (e.g. rectangular shape canal)
B_s	Breadth of ship
T	Mean draft
B_c	Width of the rectangular canal
H	Depth of water

Step 4:

$Squat = \delta = \frac{C_b \times S^{0.81} \times V^{2.08}}{20}$	
δ	Maximum ship squat at bow/ stern
C_b	Ship's block coefficient
S	Blockage factor
V	Speed through water

Confined channel $\frac{D}{d} < 2$ $Squat = \delta = \frac{C_b \times V^2}{50}$	
Open water $\frac{D}{d} > 2$ $Squat = \delta = \frac{C_b \times V^2}{100}$	
δ	Maximum ship squat at bow/ stern
C_b	Ship's block coefficient
V	Speed through water

Step 5:

$F = ID = (d_{max} + \Delta\rho_w) \times \cos\alpha + \frac{B}{2} \times \sin\alpha - (d_{max} + \Delta\rho_w)$	
$F = ID$	Increase in draft due to angle of heel
d_{max}	Deepest draft $d_{max} = d_{mn}$
$\Delta\rho_w$	Change in draft/ Adjustment due to salinity change, mm
α	Angle of heel
B	Breadth/ beam

Step 6:

$UKC = (H + HoT - E) - (T + Sq + F + \Delta\rho_w)$	
H	Charted depth
HoT	Height of tide
E	Height of swell
T	Mean draft
Sq	Maximum ship squat at bow/ stern
$F = ID$	Increase in draft due to angle of heel
$\Delta\rho_w$	Change in draft/ Adjustment due to salinity change, mm

3.4.7 VESSEL TRAFFIC SERVICES

Организация плавания в зоне обслуживания СУДС. Примеры информации, предоставляемой оператору СУДС.

RUSSIAN RONS-89	☑
Navigation in a region covered by a VTS	
In advance, before entering an area covered by a VTS system, it is necessary to study the rules of navigation in the area, which have been published in certain resolutions on port, notices to mariners, sailing directions or placed on reference and nautical charts. If necessary and possible, two VHF radio-stations should be used: one – for communication on the 16th watch channel, second – for communication on the working channel of a VTS system operator. The navigation in areas covered by a VTS shall be carried out in accordance with COLREG-72 regulations, if local regulations do not require otherwise. In case of infringement of traffic rules, it is necessary immediately to notify a VTS operator of the case and reasons of infringement. The permission to enter an area shall be given by an VTS operator, who may instruct the vessel of the traffic procedure, anchorage and action to prevent an immediate danger. In turn, the shipmaster is obliged to repeat the instructions of a station directed immediately to his vessel and, if the instructions are impossible to execute, – to inform the station of his reasons and further intentions. It should be in mind, that the accuracy of visual determination of lateral deviation of a vessel from the axis of a channel or waterway by shore Radar makes about 10-20 m, that is usually enough to maintain safe steering. Small vessels offer special hazards when they are navigating without contacts with a VTS operator and thus they frequently remain off his control.	☐

RUSSIAN RONS-89	☑
Navigation under traffic separation scheme	
While navigating under traffic separation scheme, the information of coastal control station shall continuously be obtained. In such regions two VHF radio-stations shall usually be in service. If, while navigating under a traffic separation scheme, in own opinion, any other vessel proceeds in the appropriate traffic lane in the wrong direction of traffic flow for that lane, it is necessary to check ship's position, and, even if it is correct, to proceed furthermore cautiously. In case of infringement of rules, the control station shall be immediately notified of the case and its causes.	☐

RUSSIAN RONS-89	☑
The officer of the watch, when approaching narrows, traffic separation systems, coastal waters, shall:	

Notify in advance the watch engineer of possible reverses or of changing over the Main engine to a manoeuvring mode, carrying out a trial reverse after the main engine is ready for service.	☐
Synchronize the clocks on the bridge and in the engine room.	☐
Give an order to close and seal the valves of ship's systems of draining outside.	☐
Transfer the dead reckoning on a chart of a sufficiently large scale, with the correction mark having been checked up.	☐
Pay attention to the contents of corrections made according to coastal warnings, NAVAREA and notices to mariners.	☐
Prepare nautical publications including local regulations of navigation and information on the width of regime waters.	☐
Switch on the second steering gear, if the simultaneous operation of two steering gears is technically possible.	☐
Check the direction meter on the bridge wings, switch on a VHF radio-station.	☐
Verify the compasses, switch on the radar and echo sounder, withdraw the sliding sensor of the log (if there is a risk to damage it).	☐
Check the sound and light signal systems, the machine telegraph, communication with the engine room.	☐
Prepare necessary flags, navigating lights and shapes, a signal searchlight.	☐
Estimate the ship's position.	☐
Make printing-out on a telegraph recorder sheet and compare its time against the ship's time, make a mark of time on the course recorder sheet.	☐
Supervise the closure of the doors in watertight bulkheads.	☐
Change over to manual steering, if necessary.	☐
Instruct and post lookouts.	☐
Prepare the anchors for dropping, check communication with the forecastle.	☐
When the route passes through the controlling depths for the vessel, – calculate forward and aft draft, necessary under keel clearance with allowance for list (including dynamic), squat and sea-way.	☐
Inform the master of nearing to the position indicated by him.	☐
Under the master's instruction – call the watch off duty navigators to the bridge to strengthen the watch.	☐
Monitor the reports on VHF frequencies concerning traffic and navigation warnings and give his own reports in due time.	☐
Watch positions, signals and manoeuvring of other vessels.	☐

3.4.8 WHEEL AND ENGINE ORDERS. REPORTING.

Команды рулевому, в машину, при швартовке и доклады на мостик при постановке на якорь (на английском языке)

STANDARD WHEEL ORDERS

All wheel orders given should be repeated by the helmsman and the officer of the watch should ensure that they are carried out correctly and immediately. All wheel orders should be held until countermanded. The helmsman should report immediately if the vessel does not answer the wheel.

When there is concern that the helmsman is inattentive s/he should be questioned:

"What is your heading?"

And s/he should respond:

"My heading is ... degrees."

No.	Order	Meaning
1	Midships	Rudder to be held in the fore and aft position
2	Port / starboard five	5° of port / starboard rudder to be held
3	Port / starboard ten	10° of port / starboard rudder to be held
4	Port / starboard fifteen	15° of port / starboard rudder to be held
5	Port / starboard twenty	20° of port / starboard rudder to be held
6	Port / starboard twenty-five	25° of port / starboard rudder to be held
7	Hard-a-port / starboard	Rudder to be held fully over to port / starboard
8	Nothing to port / starboard	Avoid allowing the vessel's head to go to port / starboard
9	Meet her	Check the swing of the vessel's head in a turn
10	Steady	Reduce swing as rapidly as possible
11	Ease to five / ten / fifteen / twenty	Reduce amount of rudder to 5° / 10° /15° / 20° and hold
12	Steady	Steer a steady course on the compass heading indicated at the time of the order. The helmsman is to repeat the order and call out the compass heading on receiving the order. When the vessel is steady on that heading, the helmsman is to call out: "Steady on ...".
13	Keep the buoy / mark / beacon /... on port side / starboard side	

14	Report if she does not answer the wheel	
15	Finished with wheel, no more steering	
16	Port / Starboard steer	Course to be steered ...° When the officer of the watch requires a course to be steered by com-pass, the direction in which s/he wants the wheel turned should be stated followed by each numeral being said separately, including zero. On receipt of an order to steer, the helmsman should repeat it and bring the vessel round steadily to the course ordered. When the vessel is steady on the course ordered, the helmsman is to call out: "Steady on ... ...". The person giving the order should acknowledge the helmsman's reply.
17	Steer on ... buoy / ... mark /... beacon	If it is desired to steer on a selected mark the helmsman should be ordered to: "Steer on ... buoy / ... mark /... beacon". The person giving the order should acknowledge the helmsman's reply.

STANDARD ENGINE ORDERS

Any engine order given should be repeated by the person operating the bridge telegraph(s) and the officer of the watch should ensure the order is carried out correctly and immediately.

In vessels fitted with twin propellers, the word "both" should be added to all orders affecting both shafts, e.g. "Full ahead both", and "Slow astern both", except that the words "Stop all engines" should be used, when appropriate. When required to manoeuvre twin propellers independently, this should be indicated, i.e. "Full ahead starboard", "Half astern port", etc.

No.	**Order**	**Meaning**
1	(Port / starboard engines) Full ahead / astern	
2	(Port / starboard engines) Half ahead / astern	
3	(Port / starboard engines) Slow ahead / astern	
4	(Port / starboard engines) Dead slow ahead / astern	

5	Stop (port / starboard) engines	
6	Emergency full ahead / astern	
7	Stand by engine	Engine-room personnel fully ready to manoeuvre and bridge manned to relay engine orders.
8	Finished with engines – no more manoeuvring.	Operation of engines no longer required.
9	Bow thruster full / half to port / starboard.	Where bow thrusters are used, the following orders are used.
10	Stern thruster full / half to port / starboard.	
11	Bow / stern thruster stop.	

REPORTING DURING ANCHORING

Going to anchor	
1. Stand by port / starboard / both anchor(s) for letting go.	
2. Walk out the anchor(s)	
3. We are going to anchorage.	
4. We will let go port / starboard / both anchor(s).	
5. Put ... shackles in the water / in the pipe / on deck.	
6. Walk back port / starboard / both anchor(s) one / one and a half shackle(s).	
7. We will let go port / starboard / both anchor(s) ... shackle(s) and dredge it / them.	
8. Let go port / starboard / both anchor(s).	
9. Slack out the cable(s).	1. Check the cable(s). 2. Hold on the port / the starboard / both cable(s).
10. How is the cable leading?	1. The cable is leading ~ ahead / astern. ~ to port / to starboard. ~ round the bow. ~ up and down.

11. How is the cable growing?	1. The cable is slack / tight / coming tight.
12. Is / are the anchor(s) holding?	1. Yes, the anchor(s) is / are holding. 2. No, the anchor(s) is / are not holding.
13. Is she brought up?	1. Yes, she is brought up in position ... . 2. No, she is not brought up (yet).
14. Switch on the anchor light(s).	
15. Hoist the anchor ball.	
16. Check the anchor position by bearings / by	1. The anchor position is bearing ... degrees, distance kilometers / nautical miles to ... . 2. Check the anchor position every ... minutes.
Leaving the anchorage	
1. How much cable is out?	1. ... shackle(s) is / are out.
2. Stand by for heaving up.	
3. Put the windlass in gear.	1. The windlass is in gear.
4. How is the cable leading?	1. The cable is leading ~ ahead / astern. ~ to port / to starboard. ~ round the bow. ~ up and down.
5. Heave up port / starboard / both cable(s).	
6. How much weight is on the cable?	1. Much / too much weight is on the cable. 2. No weight is on the cable.
7. Stop heaving.	
8. How many shackles are left (to come in)?	1. ... shackles are left (to come in).
9. Attention! Turn in cable(s).	
10. The anchor(s) is / are aweigh.	1. The cables are clear.
11. The anchor(s) is / are clear of the water / home / foul /secured.	

REPORTING DURING BERTHING/ UNBERTHING

General	
1. Is / are the propeller(s) clear?	1. Yes, the propeller(s) is clear. 2. No, the propeller(s) is not clear. 3. Keep the propeller(s) clear.
2. Are fenders on the berth?	1. Yes, fenders are on the berth. 2. No, fenders are not on the berth.
3. Have fenders ready fore and aft.	
Berthing	
1. We will berth port side / starboard side alongside.	
2. We will moor ~ to buoy(s) (ahead and astern). ~ alongside. ~ to dolphins.	
3. Send out ~ the head / stern / breast lines. ~ the ... spring(s) forward / aft.	
4. Do you have tension winches?	1. Yes, we have tension winches (forward and aft). 2. No, we do not have tension winches.
5. Have the heaving lines ready forward and aft.	
6. Send the heaving / head / stern / breast line(s) ashore.	
7. The linesmen will use shackles / lashings for securing the mooring.	
8. Use ~ the centre lead / panama lead. ~ the bow lead. ~ the port quarter / starboard quarter lead.	
9. Heave on the ... line(s) / ... spring(s).	
10. Pick up the slack on the ... line(s) / ... spring(s).	
11. Heave away.	1. Stop heaving.
12. Slack away/check the ... line(s) / ... spring(s).	

13. Hold on the ... line(s) / ... spring(s).	
14. Heave in easy.	1. Heave alongside.
15. Keep the ... line(s) / ... spring(s) tight.	
16. Report the forward / aft distance to	1. The forward/aft distance to ... is ... metres.
17. We have to move ... metres ahead / astern.	
18. We are in position.	
19. Make fast fore and aft.	
20. Finished with manoeuvring stations.	
Unberthing	
1. Stand by engine(s).	
2. Are you ready to get underway?	1. Yes, we are ready (to get underway). 2. No, we are not ready (yet) (to get underway). 3. We will be ready to get underway in ... minutes.
3. Stand by for letting go.	
4. Single up the ... lines and ... springs fore and aft.	
5. Slack away / hold on / heave on the 6. ~ head / stern line. 7. ~ breast line. 8. ~ fore / aft spring.	
9. Let go 10. ~ the head / stern line. 11. ~ the breast line. 12. ~ the fore / aft spring 13. ~ all (forward / aft).	
14. Let go the towing line(s).	
15. Stand by bow anchor(s).	
16. Finished with manoeuvring stations.	

3.4.9 VOYAGE DATA RECORDER

Виды информации, которые записываются в Прибор регистрации данных рейса по каналу управления судном

SOM PART 13.9

No.	Interfaces	VDR	SVDR
1	Date and time	✓	✓
2	Ship's position	✓	✓
3	Speed	✓	✓
4	Heading	✓	✓
5	Bridge audio	✓	✓
6	Communication audio	✓	✓
7	Radar data – post display selection	✓	Only if standard interfaces available
8	AIS	✓	If no radar is connected
9	Echo sounder	✓	Any other Serial (NMEA) format
10	Main alarms	✓	
11	Rudder order and response	✓	
12	Engine order and response	✓	
13	Hull openings (doors) status	✓	
14	Watertight and fire doors status	✓	
15	Acceleration and hull stresses	✓	
16	Wind speed and direction	✓	

VDR 4340

The purpose of a Voyage Data Recorder (VDR) is to maintain a store, in a secure and retrievable form, of information concerning the position, movement, physical status, command and control of a vessel over the period leading up to, and following, an incident having an impact thereon. This information is for use during any subsequent investigation to identify the cause(s) of the incident.
The VDR can continuously record bridge audio communications, sensor data, alarm status as well as radar images.

3.5 MOORING/ UNMOORING OPERATIONS

Управление судном при выполнении швартовых операций.

3.5.1 SAFETY REQUIREMENTS

Техника безопасности при выполнении швартовых операций

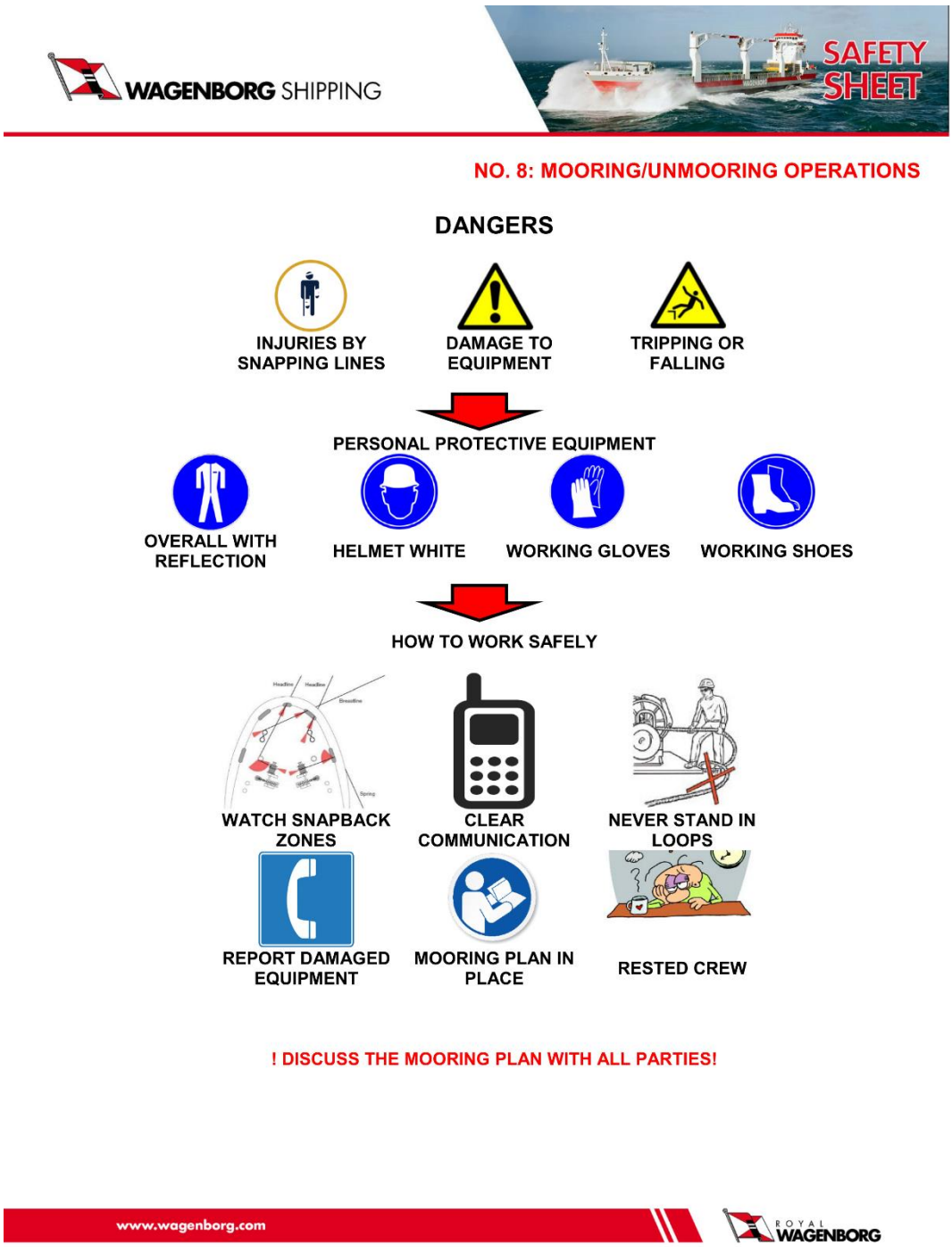


Figure 3.5.1.1. Safety sheet No. 8 – Mooring/ Unmooring operations [3.5]

3.5.2 MOORING LINE ARRANGEMENT

Схемы швартовок/ отшвартовок судна в порту или в открытом море. Название всех швартовов и деталей швартовного устройства на русском и английском языках.

AFT STATION

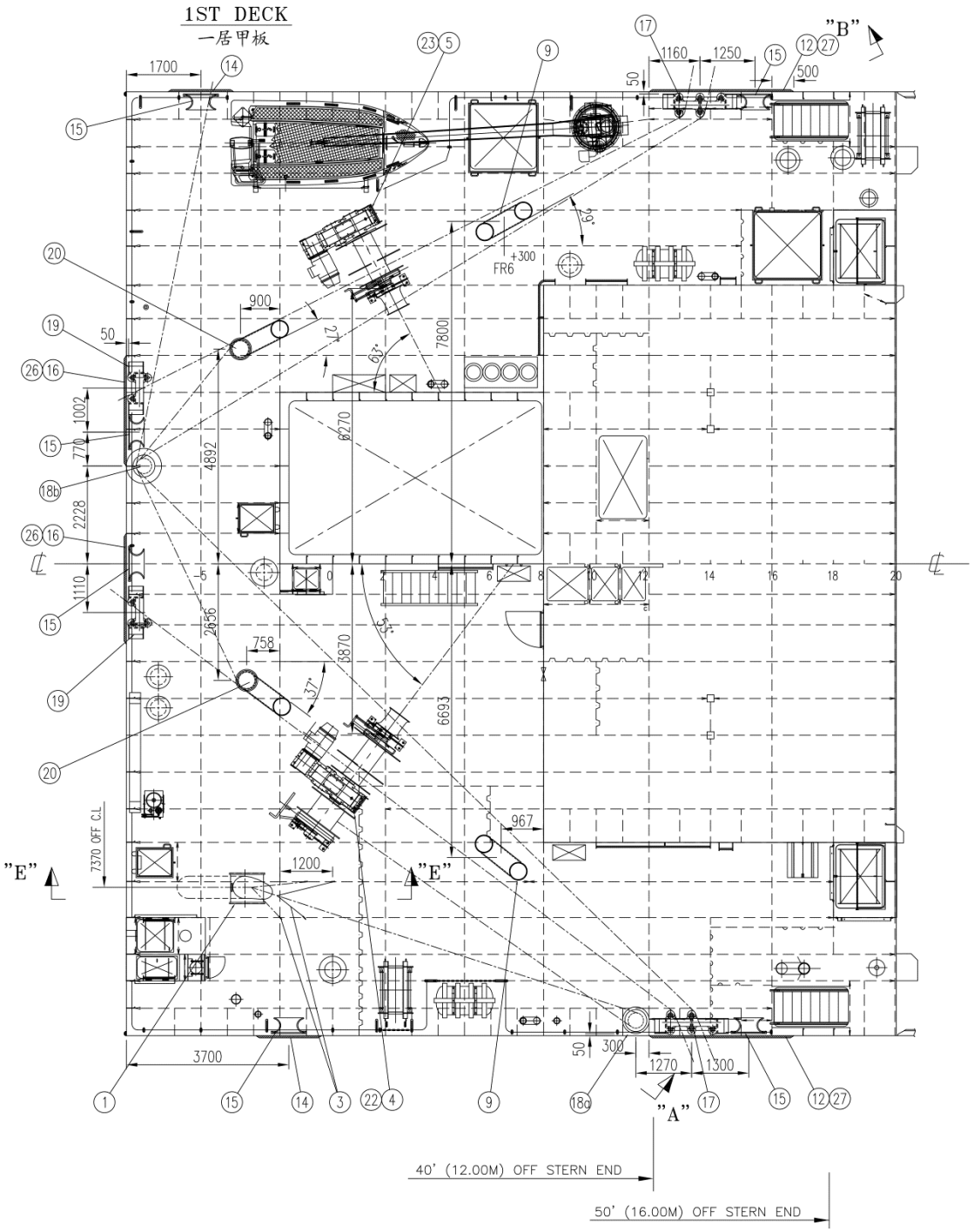


Figure 3.5.2.1. Aft mooring station arrangement plan [3.5]

FORWARD STATION

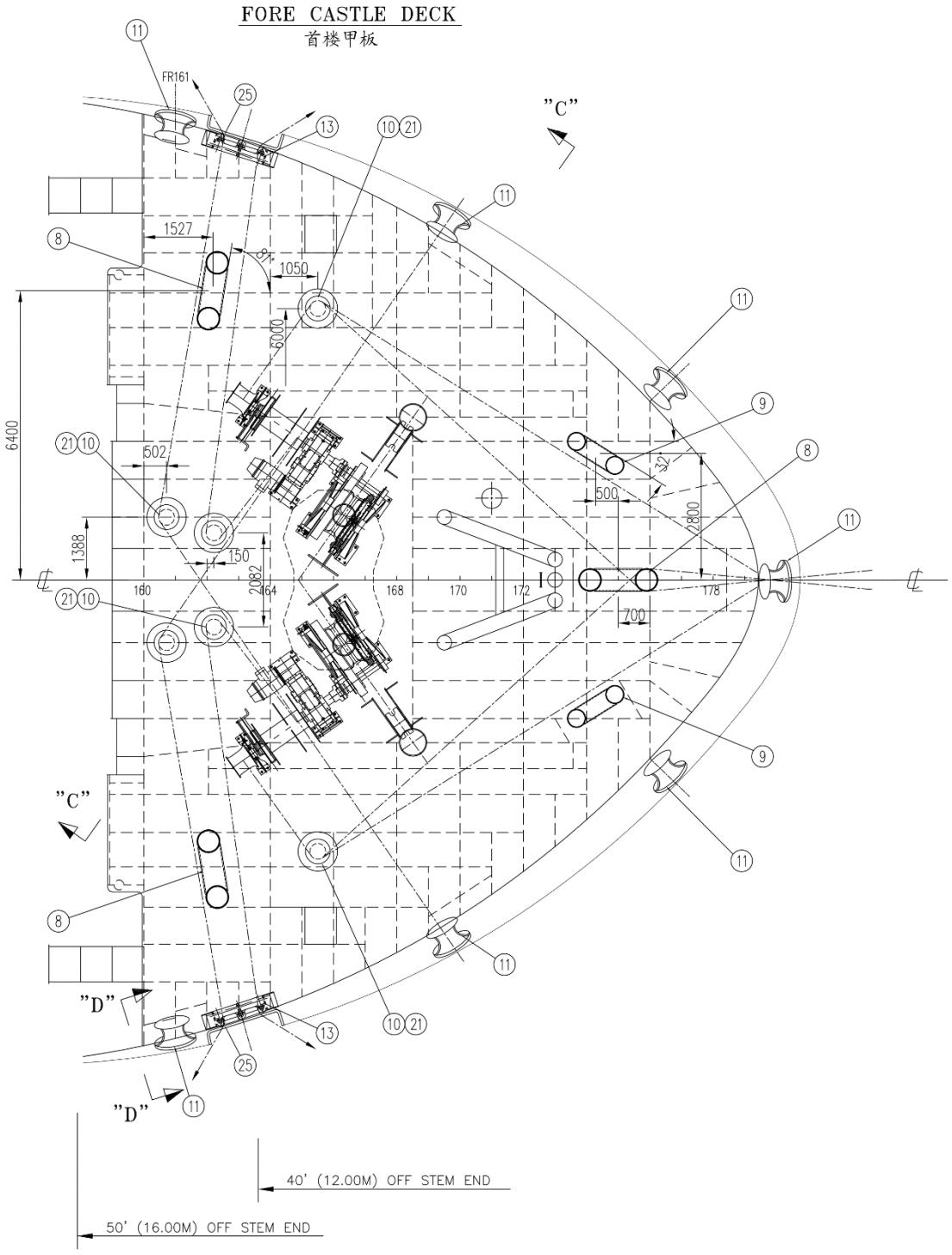


Figure 3.5.2.2. Forward mooring station arrangement plan [3.5]

LEGEND AND GLOSSARY

No.	English	Russian
1	Cover for stern hawse pipe	
2	Stern anchor chain cable	
3	Wire of anchor stop	
4	Stern windlass	
5	Stern winch	
6	Stern anchor	
7	Suez Canal search light seat	
8, 9	Double bollards	
10	Roller	
11, 15	Panama chocks	
12, 24C, 25, 26	Round bars	
13	7-roller fairlead	
14, 16, 27	Half round bars	
17	11-roller fairlead	
18a, 18b	Single roller fairleads	
19	6-roller fairlead	
20	Double bollard with roller	
21	Foundation for single roller	
22	Foundation of stern windlass	
23	Foundation of stern winch	
24, 24A, 24B	Stern hawse pipes	
24D	Casting	
28	SWL marking	
	Stern line	
	Spring line	
	Breast line	
	Head line	

3.5.3 OOW'S DUTIES AT MANOEUVRING STATIONS

Обязанности помощника при выполнении швартовых операций

No.	To-do	OOW's duties
1	Check	Winches' operation, mooring lines' arrangement, personnel's PPE
2	Control	Mooring lines' tension, ship position, finish operation
3	Report	Readiness, distance, clearance, mooring lines ashore/ on deck

3.5.4 TOWING GEAR. EMERGENCY TOWING BOOKLET.

Схема буксирного устройства своего судна. Буклет аварийной буксировки и места его размещения на судне.

AFT STATION

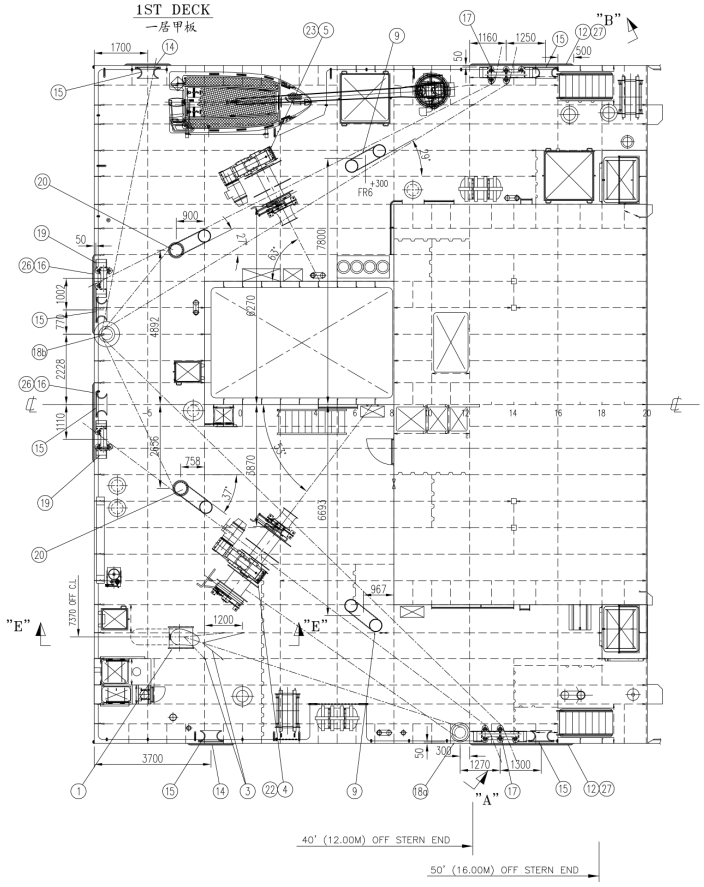


Figure 3.5.4.1. Aft mooring station arrangement plan [3.5]

FORWARD STATION

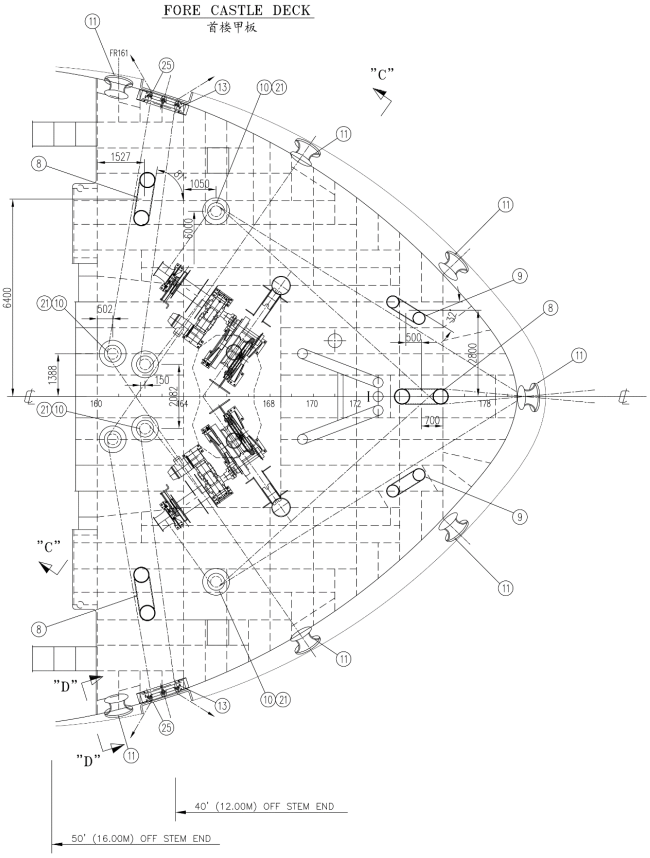


Figure 3.5.4.2. Forward mooring station arrangement plan [3.5]

TOWING GEAR

No.	**Towing gear**	***SWL, kN***
1	Cover for stern hawse pipe	
2	Stern anchor chain cable	
3	Wire of anchor stop	
4	Stern windlass	
5	Stern winch	
6	Stern anchor	
7	Suez Canal search light seat	
8, 9	Double bollards	1020, 560
10	Roller	441
11, 15	Panama chocks	627

12, 24C, 25, 26	Round bars	
13	7-roller fairlead	441
14, 16, 27	Half round bars	
17	11-roller fairlead	441
18a, 18b	Single roller fairleads	441
19	6-roller fairlead	441
20	Double bollard with roller	
21	Foundation for single roller	
22	Foundation of stern windlass	
23	Foundation of stern winch	
24, 24A, 24B	Stern hawse pipes	
24D	Casting	
28	SWL marking	
	Stern line	
	Spring line	
	Breast line	
	Head line	

EMERGENCY TOWING BOOKLET

Location	The bridge – 1 copy Forecastle/ Boatswain's store – 1 copy
Contents	Part 1 – General List of contents/ Checklist of revisions Main particulars Part 2 – Organization Status and decision matrix Towing patterns Part 3 – Towing Tasks and equipment Examples connecting towing lines

3.6 ANCHORAGE

Управление судном при постановке и съемке судна с якоря

3.6.1 SAFETY REQUIREMENTS

Техника безопасности при выполнении якорных операций

Reference: 3.5.1 Safety requirements

3.6.2 OOW'S DUTIES BEFORE ANCHORING

Действия вахтенного помощника при подходе к месту якорной стоянки

RUSSIAN RONS-89	☑
The officer of the watch, while the ship is anchoring, shall:	
Inform the watch engineer in advance, check communications with the engine room, synchronize the bridge clock and the engine room clock.	☐
Estimate ship's position and transfer the dead reckoning onto a large-scale chart.	☐
Switch on an echo sounder, withdraw the sliding sensor of the log.	☐
Establish a VHF radio-station on the appropriate channel.	☐
Establish, if specified by local regulations, communications with authorities or with a VTS service, verify time and place of anchoring, a VHF radio-communication channel (while at anchor).	☐
Send the Boatswain to the forecastle to prepare the anchor gear for using, check communications with the forecastle.	☐
Check and prepare for using the light and sound signal systems, additional aids required by local regulations.	☐
Change over to manual steering.	☐
After anchoring – estimate a ship's position, notify the watch engineer of the main engine preparedness carried out according to master's instructions, measure depths under keel, decide on control coastal landmarks, estimate and plot on the chart a circle of the ship's probable position, with the length of the paid-out chain and the ship's length overall being taken into account.	☐

3.6.3 ANCHORING PLAN. ANCHOR GEAR.

Схемы постановки судна на якорь (фото карты). Оптимальная длина отдаваемой якорной цепи). Названия всех деталей якорного устройства на русском и английском языках.

ANCHORING PLAN

No.	Factor	Remark
1	Speed reduction in ample time	
2	Direction/ strength of wind and current	
3	Tidal stream when manoeuvring at low speeds	
4	Need for adequate sea room particularly to seaward	
5	Depth of water	
6	Type of seabed	
7	Scope of anchor cable required	

REQUIRED SCOPE OF ANCHOR CABLE. ANCHORING RADIUS.

Step	Description	Remark
1	Forces affecting on ship at anchor Condition against drifting/ dragging – Safe criteria at anchor: $R_{Forces} < F_{Anchor\ gear}$ where: R_{Forces} – Total outer forces affecting F_{Anchor} – Anchoring gear holding force	
2	Total outer forces affecting $R_{Forces} = R_a + R_c + R_i + R_w$ where: R_a – Force from wind R_c – Force from current	

	R_i – Force from inertia R_w – Force from wave	
3	Force from wind $R_a = \frac{1}{2} \cdot \rho_a \cdot C_a \cdot \left[S_y \cdot (\cos \varphi)^2 + S_x \cdot (\sin \varphi)^2\right] \cdot W^2$ where: $\rho_a = 0.000125$ – Atmosphere density, $t \cdot s^2/m$ C_a – Tabulated coefficient of wind force, N S_y – Projection area above WL at midships, m^2 S_x – Projection area above WL at centreline, m^2 φ – Angle of wind, ° W – Wind speed, m/s	
4	Force from current $R_c = 0.000143 \cdot S_w \cdot {V_c}^2$ where: S_w – Projection area at WL, m^2 V_c – Speed of current (rate), m/s	
5	Force from inertia $R_i = 8.5 \cdot M_{Anchor}$ where: M_{Anchor} – Anchor weight, t	
6	Force from wave $R_w = \left(k_{dynamic} - 1\right) \cdot (R_a + R_c + R_i)$ where: $k_{dynamic} = 1.4 \div 1.7$ – Dynamic coefficient of the wave force	
7	Total outer forces affecting $R_{Forces} = R_a + R_c + R_i + R_w$ $R_{Forces} = k_{dynamic} \cdot (R_a + R_c + R_i)$	
8	Anchoring gear holding force $F_{Anchor\ gear} = F_{Anchor} + F_{Anchor\ cable}$	

where:

F_{Anchor} – Anchor holding force
$F_{Anchor\ cable}$ – Anchor cable holding force

Anchor holding force

$$F_{Anchor} = 8.5 \cdot k_{Anchor} \cdot M_{Anchor}$$

where:

k_{Anchor} – Coefficient of anchor holding force

Anchor type	**Mud bottom**	**Sand bottom**	**Rock bottom**
Admiralty	2.2	3.0	3.1
Hall	2.2	1.5	2.8
Matrosova	11.5	8.0	–

Anchor cable holding force

$$F_{Anchor\ cable} = a \cdot q_{Cable} \cdot f_{Cable} \cdot g$$

where:

a – Length of anchor cable on the bottom, m
$q_{Cable} = 0.00018 \cdot {d_{Cable}}^2$ – Linear density of 1 m of anchor cable in water, kN/m
d_{Cable} – Caliber of anchor cable, mm
f_{Cable} – Friction coefficient of anchor cable on the bottom , tabulated
g – Gravitational acceleration, m/s^2

9 **REQUIRED SCOPE OF ANCHOR CABLE**

$$l_{Cable} = 0.17 \cdot \left(\sqrt{\frac{R_{Forces}}{q_{Cable}} \cdot \left(67.5 \cdot h_{Hawse} + \frac{R_{Forces}}{q_{Cable}} \right)} - \frac{R_{Forces}}{q_{Cable}} \right)$$

$$h_{Hawse} = H + H_{freeboard} - d_m$$

where:

h_{Hawse} – Height of anchor hawse above the bottom, m
H – Depth of water, m
$H_{freeboard}$ – Height of anchor hawse above the baseline, m

	$d_m = \frac{d_f + d_a}{2}$ – Mean draft, m Length of anchor cable hanging in the water, above the bottom $l_{Hanging} = h_{Hawse} \cdot \sqrt{\frac{10.5 \cdot R_{Forces}}{d_{Cable} \cdot h_{Hawse}} + 1}$ Length of anchor cable on the bottom $a = l_{Cable} - l_{Hanging}$ **NUMBER OF SHACKLES** $N_{Shackles} = \frac{l_{Cable}}{27.5}$ Russia's requirement: $N_{Shackles} = \sqrt{H}$ Great Britain's requirement: $N_{Shackles} = 1.5 \cdot \sqrt{H}$ Japan's requirement: $l_{Cable} = 3 \cdot H + 90$ – Normal weather condition $l_{Cable} = 4 \cdot H + 145$ – Strong wind Rule of thumb: $N_{Shackles} = \frac{l_{Cable}}{27.5} = \frac{LOA + H}{27.5}$	
10	**ANCHORING RADIUS** $R_{Anchoring} = a + l_{Hanging} + LOA = l_{Cable} + LOA$	

ANCHORING ARRANGEMENT PLAN

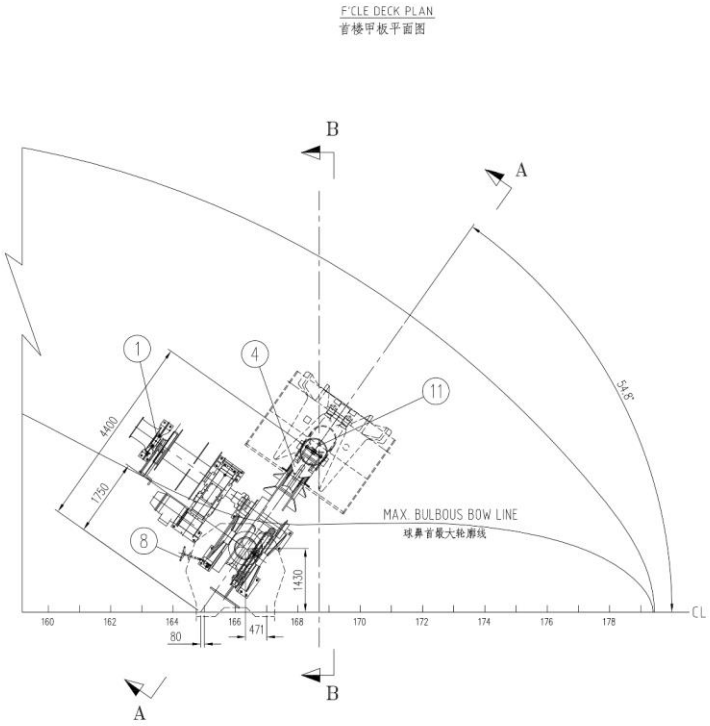


Figure 3.6.3.1. Forecastle deck plan [3.6]

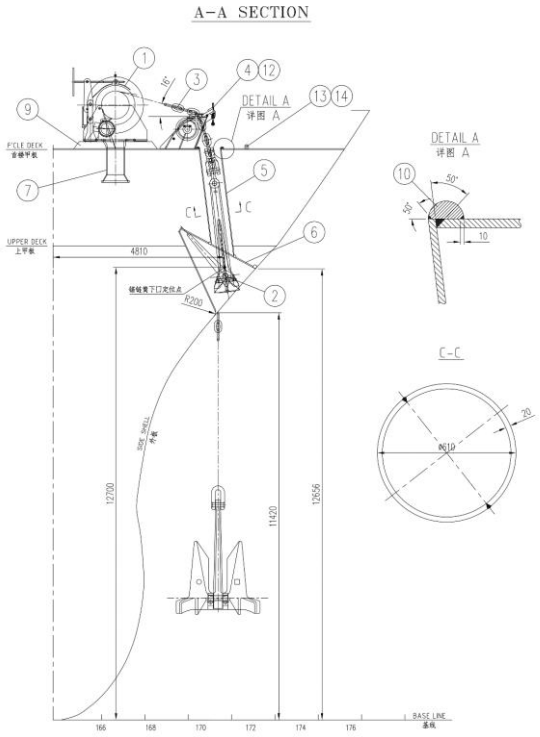


Figure 3.6.3.2. A-A section [3.6]

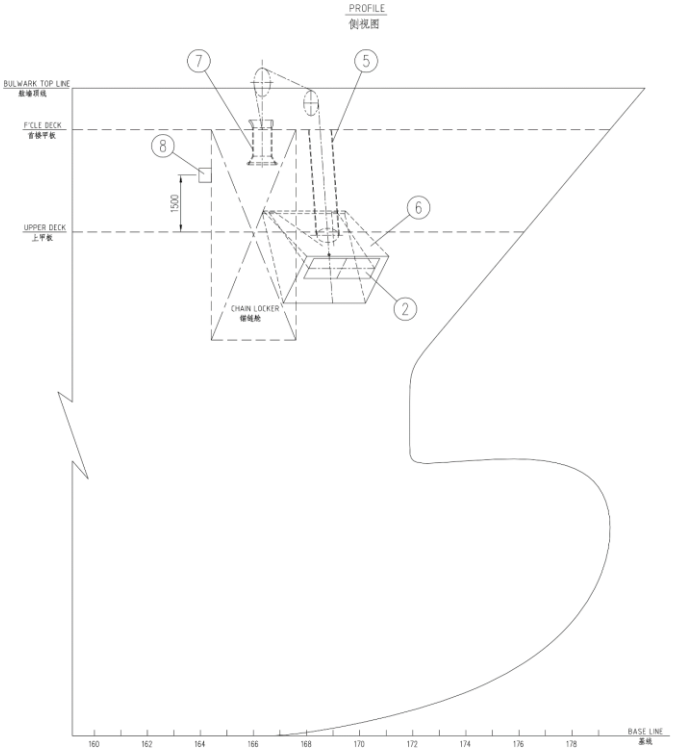


Figure 3.6.3.3. Profile [3.6]

LEGEND AND GLOSSARY

No.	English	Russian
1	Windlass	
2	High holding power anchor	
3	Bow chain cable	
4	Chain stopper	
5	Bow hawse pipe	
6	Bow anchor pocket	
7	Chain pipe	
8	Dog type cable clenches	
9	Foundation of windlass	
10	Half round bar	
11	Cover for bow hawse pipe	
12	Securing wire	
13	Eye plate	
14	Shackle	

3.6.4 WATCHKEEPING ORGANIZATION

Организация вахтенной службы и обязанности вахтенного помощника при стоянке судна на якоре. Все способы определения дрейфа судна на якоре.

WATCHKEEPING AT ANCHOR

RUSSIAN RONS-89	☑
While at anchor, the officer of the watch shall:	
Provide supervision of the ship's craft launched and of other crafts launched and lying alongside of the ship, arrange communication with them.	☐
Supervise the process of cargo operations at the road.	☐
Make a control fixing of the ship's position at the end of the watch (or during the watch, if necessary).	☐
Arrange continuous observation of weather conditions, environmental conditions, other vessels, absence of drift of the vessel.	☐
Check systematically depth under keel, the state of the anchor, the tension of the anchor cable, reliable fastening of the stoppers, absence of a spontaneous running-out of the cable, with tidal phenomena taken into account.	☐
When the wind is freshening, anchor cables are usually paid-out. In doing so one should visualize the length of time for hauling in the anchors in order not to let the ship drift to a danger while it is weighing anchors.	

3.6.5 OOW'S DUTIES WHILE ANCHORING

Обязанности помощника на баке при постановке/съемке судна с якоря

No.	**To-do**	**OOW's duties**
1	Check	Winches' operation, anchoring black ball, personnel's PPE
2	Control	Safety, anchor chain, anchor
3	Report	Readiness, anchor cable leading, tension, length

SIGNS OF DRIFTING

No.	Sign of drifting	Remark
1	*Судно перестает рыскать, то есть направление ветра относительно диаметральной плоскости судна не меняется, корпус судна разворачивается практически лагом к ветру и «замирает» в этом положении.*	
2	*Появление рывков якорной цепи (якорная цепь натягивается втугую, затем резко провисает).*	
3	*Биение якорной цепи в клюзе и вздрагивание цепи под ногой у палубного клюза.*	
4	Changes of control EBL and VRM. *Изменение контрольных пеленгов и дистанций.*	

3.7 STORMY WEATHER

Управление судном при плавании в штормовых условиях

3.7.1 SAFETY REQUIREMENTS

Техника безопасности во время штормового плавания

SOM PART 13.5	☑
WEATHER CONDITIONS AND WEATHER INFORMATION The OOW shall observe weather conditions closely at all times and the master shall not hesitate to alter course and speed or seek shelter to avoid heavy weather that might damage the vessel including crew or cargo. The master shall require all available weather information, including SPOS. A study of this information shall be made in connection with local conditions as observed on the vessel.	
SOM PART 17.5	☑
WORK ON DECK DURING BAD WEATHER Before any jobs are done on deck during bad or questionable weather, consideration should be made on the necessity of the job. If the job needs to be performed, the following points are to be taken into account as a minimum: ▪ Only after authorization of the master. ▪ Appropriate PPE according the safety folder. ▪ At least two persons, each equipped with a radio. ▪ Inform the bridge when leaving the accommodation and when entering a safe area.	

3.7.2 CHECKLIST

Мероприятия при подготовке судна к плаванию в штормовых условиях (чек-лист)

STRONG WIND AND HEAVY WEATHER

RUSSIAN RONS-89	☑
The watch officer, while the ship is being prepared for navigation in storm conditions (after receiving a storm warning signal and after the wind and sea become stronger), shall:	

Inform in advance the watch engineer and change over the main engine to the manoeuvring mode according to the master's instruction.	☐
Notify the crew of an approaching storm, of necessary measures relevant to ship's equipment under responsibility of designated crew members and of the order of persons' movement on board the ship.	☐
Check mechanical telegraph, communication with steering and engine rooms, synchronize the bridge clock and the engine room clock.	☐
Change over to manual steering, make necessary arrangements for change-over to stand-by and emergency steering.	☐
Give instructions on: checking for reliable closure of hatches, access holes of holds, light hatches, air scuttles, fans, measuring tubes, air tubes as well as checking all water-tight closure conditions.	☐
Securing main gangways, life boats, mooring ropes, ship's property on open decks and in ship's spaces.	☐
Checking fastening and additional fastening of loads in holds and on deck.	☐
Checking reliable covering of deck devices and mechanisms.	☐
Fitting storm lines on cargo deck.	☐

3.7.3 DETERMINING WIND SPEED AND DIRECTION

Определение скорости и направления истинного ветра при помощи круга СМО

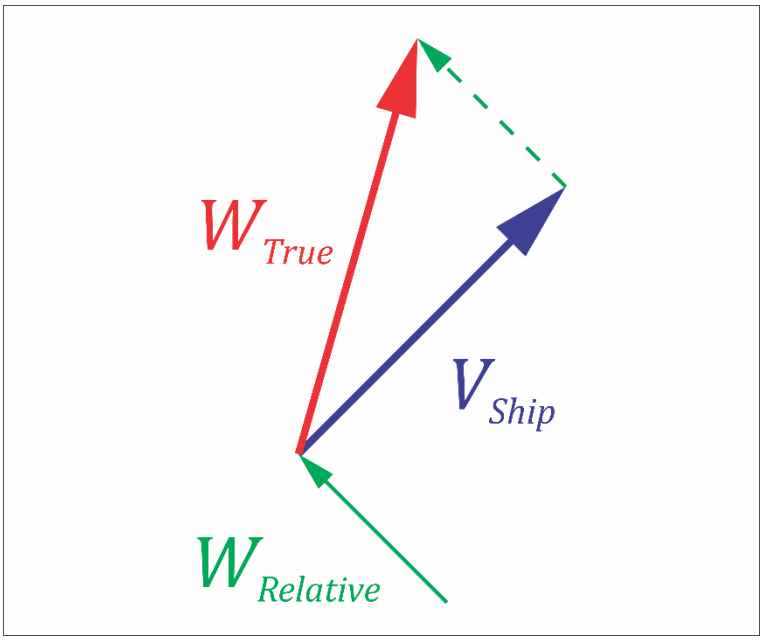


Figure 3.7.3.1. True wind vector triangle [3.7]

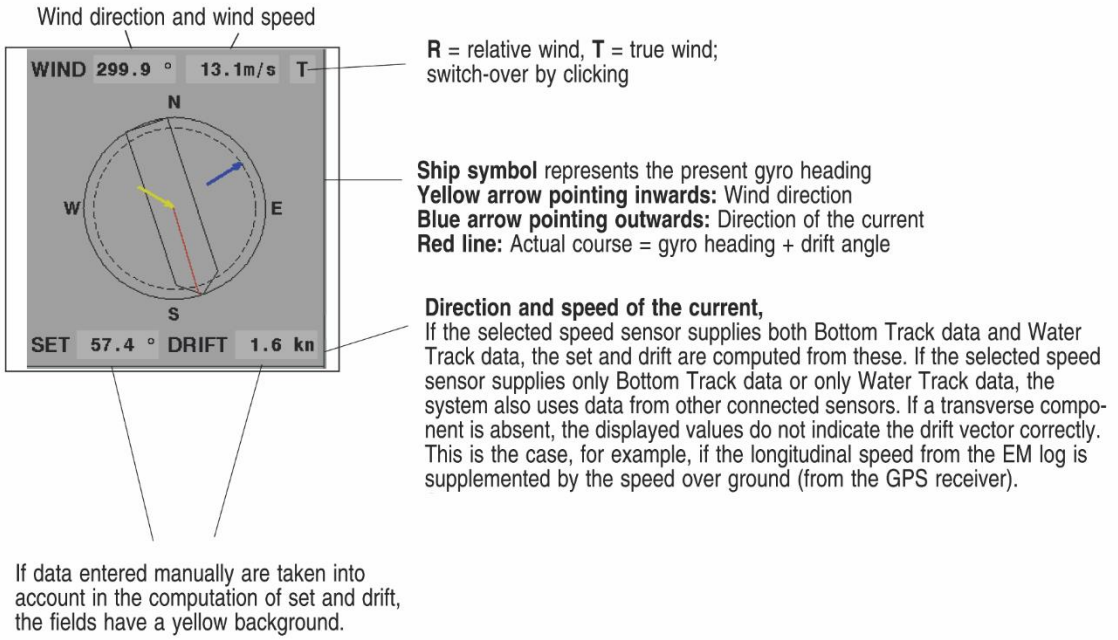
TRUE WIND VECTOR TRIANGLE

Step	Description	Remark
1	$\vec{W}_{Ship} = -\vec{V}_{Ship}$	
2	$\boldsymbol{\vec{W}_{True} = \vec{W}_{Relative} - \vec{W}_{Ship} = \vec{W}_{Relative} + \vec{V}_{Ship}}$ $\vec{W}_{Relative} = \vec{W}_{True} + \vec{W}_{Ship} = \vec{W}_{True} - \vec{V}_{Ship}$	
3	$\vec{W}_{True}{}^2 = (\vec{W}_{Relative} - \vec{W}_{Ship})^2 = (\vec{W}_{Relative} + \vec{V}_{Ship})^2$ $W_{True} = \lvert\vec{W}_{True}\rvert = \sqrt{(\vec{W}_{Relative} + \vec{V}_{Ship})^2}$ $W_{True} = \sqrt{W_{Relative}{}^2 + 2 \cdot W_{Relative} \cdot V_{Ship} \cdot \cos(\widehat{\vec{W}_{Relative}; \vec{V}_{Ship}}) + V_{Ship}{}^2}$	

КРУГ СМО (СЕВАСТОПОЛЬСКОЙ МОРСКОЙ ОБСЕРВАТОРИИ)

Step	Description	Remark
1	Поворачивают верхний прозрачный круг так, чтобы румб или градусное деление, соответствующее наблюдаемому на судне направлению ветра, пришлось у стрелки-указателя.	
2	От центра круга откладывают по направлению к стрелке-указателю в произвольном масштабе расстояние, соответствующее измеренной скорости ветра и на конце этого вектора ставят точку В	
3	Поворачивают верхний прозрачный круг так, чтобы у стрелки-указателя находилось деление, отвечающее истинному курсу судна во время наблюдение за ветром	
4	Аналогично пункту 2, в конце вектора ставят точку К (узлы необходимо перевести в м/с умножив на 0,51)	
5	Поворачивают прозрачный круг так, чтобы точки К и В оказались на одной линии, параллельной вертикальному диаметру нижнего круга (точка В ниже точки К)	
6	Отсчитывают градусное деление у стрелки, и измеряют расстояние между точками К и В. Отсчитанное градусное деление даёт направление истинного ветра, а расстояние ВК – скорость ветра (в м/с).	

WIND AND SET DISPLAY ON MULTIPILOT

Description	Remark
As there is a wind sensor connected, the wind data and the set and drift caused by the current can be displayed numerically and graphically on the Wind display.  	

3.7.4 MANOEUVRING IN STORM. SAFE COURSE AND SPEED.

Способы штормования судна, понятия слеминга и брочинга. Диаграмма штормования, применяемой на судне. Расчет по определению безопасного курса и скорости на диаграмме.

MANOEUVRING IN STORM

No.	Method	Explanation
1	*Штормование на носовых курсовых углах*	Этот способ штормования наиболее приемлем для судов, у которых полубак защищает палубу от заливания; полные обводы носовой части и дифферент на корму облегчают всплывание судна на волне. Для удержания судна носом к волне необходимо обеспечивать минимальный ход, достаточный для управления. При этом следует учитывать, что малая скорость судна требует частых и больших перекладок руля. Если судно достаточно хорошо управляется, а бортовая качка не очень большая, то можно идти курсом не строго против волны, а встречать волну скулой. Крупнотоннажным судам рекомендуется для уменьшения изгибающих моментов на корпусе штормование на курсовых углах волнения 35–45°.

2	*Штормование на кормовых курсовых углах*	Этот способ заключается в том, что судно ложится на курс прямо по волне или под углом к ней. Способ возможен, если длина волны значительно отличается от длины судна. Его нужно применять при хорошей остойчивости и управляемости, т.к. судно должно идти с малой скоростью. При длине судна, соизмеримой с длиной волны, движение судна со скоростью, когда оно обгоняет волны, особенно опасно.
3	*Штормование лагом к волне*	Этот способ штормования в большинстве случаев нежелателен. Он допустим для судов с достаточной остойчивостью. При этом способе судно испытывает большие накренения, поэтому он неприемлем для судов с палубным грузом, с малым надводным бортом и большой остойчивостью (резкие углы крена с малым периодом).
4	*Штормование с застопоренной машиной*	При этом способе штормования из-за загрузки, расположения центра парусности и своих конструктивных особенностей судно под воздействием ветра и волнения занимает определенное положение по отношению к волне. Обычно это положение лагом к волне или под небольшим углом к ней. Суда с большой остойчивостью будут испытывать большие и резкие углы накренения, которые очень опасны для палубного груза и судовых механизмов. Дрейф судна с застопоренной машиной может быть пассивным, когда судно теряет управляемость, и активным, когда для удержания и приведения против ветра и волны судно использует вытравленную цепь с якорем. Активный дрейф может быть как носом, так и кормой к волне.
5	*Штормование на якоре (якорях)*	Этот способ применим в том случае, когда сумма внешних сил не превышает держащую силу якорного устройства, а выбранное место якорной стоянки удовлетворяет условиям безопасности. Этот способ предусматривает отдачу второго якоря и подработку машиной для разворота судна против волны или под небольшим углом к ней.

TERMINOLOGY

No.	**Term**	**Explanation**
1	Bow slamming *Слеминг*	Heavy impact resulting from a vessel forward bottom making sudden contact with the sea surface after having risen on a wave. Similar action results from rapid immersion of the bow in vessels with large flare. The magnitude of slamming is drastically decreased as draft is increased. Draft/Length should exceed 0.045 to permit maintaining a reasonable speed and still avoid severe slamming in a seaway.
2	Broaching-to phenomenon *Брочинг*	Large following waves acting on the ship can force her to move with the same speed – the ship begins to move with the wave simultaneously. This is known as surf-riding. The majority of ships are directionally unstable during surf-riding so the ship can experience an un-steered turn to a beam position relative to the waves. Such uncontrolled turning is known as broaching-to phenomenon.

SAFE COURSE AND SPEED

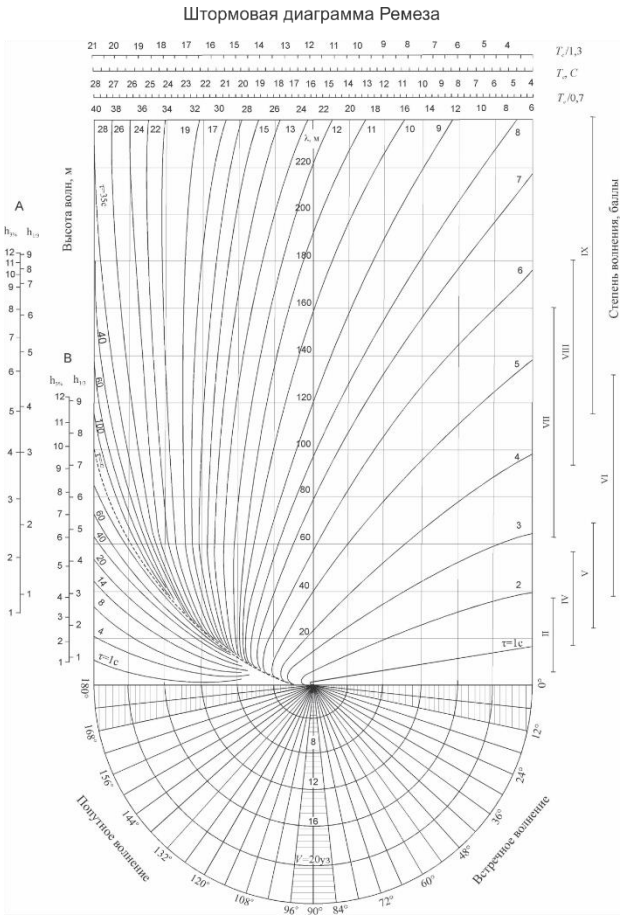


Figure 3.7.4.1. Diagram Remez – Штормовая диаграмма Ремеза [3.7]

3.7.5 WEATHER CHARTS. SYNOPTIC CHARTS.

Способы получения метеопрогноза и карты погоды. Чтение синоптической карты.

No.	Source	Description
1	National Oceanic and Atmospheric Administration – U.S. Department of Commerce NOAA's National Weather Service	https://tgftp.nws.noaa.gov/fax/
2	Japan Meteorological Agency	https://www.jma.go.jp/en/g3/
3	SPOS	
4	Facsimile receiver	

Reference: 4.2. Facsimile/ Synoptic Weather Charts

3.7.6 BEAUFORT SCALE

Определение интенсивности волнения и скорости ветра в баллах по шкале Бофорта

Force	Description	Wind speed	Wave height	Sea conditions
0	Calm	< 1 kn	0 m	Sea like a mirror.
1	Light air	1-3 kn	0-0.3 m	Ripples with appearance of scales are formed, without foam crests.
2	Light breeze	4-6 kn	0.3-0.6 m	Small wavelets still short but more pronounced; crests have a glassy appearance but do not break.
3	Gentle breeze	7-10 kn	0.6-1.2 m	Large wavelets; crests begin to break; foam of glassy appearance; perhaps scattered white horses.
4	Moderate breeze	11-16 kn	1-2 m	Small waves becoming longer; fairly frequent white horses.
5	Fresh breeze	17-21 kn	2-3 m	Moderate waves taking a more pronounced long form; many white horses are formed; chance of some spray.
6	Strong breeze	22-27 kn	3-4 m	Large waves begin to form; the white foam crests are more extensive everywhere; probably some spray.
7	High wind, moderate gale, near gale	28-33 kn	4-5.5 m	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind; spindrift begins to be seen
8	Gale, fresh gale	34-40 kn	5.5-7.5 m	Moderately high waves of greater length; edges of crests break into spindrift; foam is blown in well-marked streaks along the direction of the wind.
9	Strong/ severe gale	41-47 kn	7-10 m	High waves; dense streaks of foam along the direction of the wind; sea begins to roll; spray affects visibility.
10	Storm, whole gale	48-55 kn	9-12.5 m	Very high waves with long overhanging crests; resulting foam in great patches is blown in dense white streaks along the direction of the wind; on the whole the surface of the sea takes on a white appearance; rolling of the sea becomes heavy; visibility affected
11	Violent storm	56-63 kn	11.5-16 m	Exceptionally high waves; small- and medium-sized ships might be for a long time lost to view behind the waves; sea is covered with long white patches of foam; everywhere the edges of the wave crests are blown into foam; visibility affected.
12	Hurricane force	≥ 64 kn	≥ 14 m	The air is filled with foam and spray; sea is completely white with driving spray; visibility very seriously affected.

3.7.7 UNSTABLE SIGNS. METACENTRIC HEIGHT.

Признаки ухудшения остойчивости судна в штормовых условиях. Использование "капитанской" формулы для определения метацентрической высоты.

UNSTABLE SIGNS

No.	Signs	Explanation
1	Sudden increase of list *Неожиданное увеличение крена при нахождении вершины отдельных волн вблизи миделя судна, существенно превышающее значение предшествующих углов статического крена или амплитуд бортовой качки.*	
2	Long period of rolling *Длительное наклонение судна на борт.*	
3	Slowly return back to right position *Задержка (зависание) в положении максимального крена и медленное возвращение в исходное состояние.*	

METACENTRIC HEIGHT

No.	Formula	Explanation
1	Metacentric height $h = \left(\frac{B}{T} \cdot f\right)^2$	h – Metacentric height, m B – Ship breadth, m T – Rolling period, s f – Coefficient as per IMO recommendation, $f \in \left(\frac{H}{B}, C_b, C_a\right)$ $f = 0.88$ – Old vessel (ballast, except tanker) $f = 0.80$ – Fishing vessel (full, open sea) $f = 0.95$ – Fishing vessel (full, coastal) $f = 0.60$ – Fishing vessel (full, with fish tanks) $f = 0.62 \div 1.00$ – Cargo vessel (loaded, except tanker and chemical)
2	Rolling period $T = \frac{\Delta t}{n}$	T – Rolling period, s Δt – Observed period, s n – Number of full rolls
3	Period of wave $T_w = \frac{\Delta t}{n - 1}$	T – Period of wave, s Δt – Observed period, s n – Number of wave peaks

3.8 CARGO OPERATIONS

Грузовые операции

3.8.1 SAFETY REQUIREMENTS

Мероприятия для соблюдения техники безопасности экипажа во время грузовых операций

Figure 3.8.1.1. Safety sheet No. 9 – Cargo operations [3.8]

3.8.2 OOW'S DUTIES

Обязанности вахтенного помощника при проведении грузовых операций на судне

SOM PART 15	☑
LOADING AND DISCHARGING The chief officer ensures that a deck officer is on duty and on deck during the cargo operations. When the officer on duty needs a break, he should be relieved. If needed, he has to be assisted by other crewmembers.	
CARGO DAMAGE AND SHORTAGE A deck officer shall be on duty at all times to supervise the cargo operations and to write down all remarks with respect to cargo damage and shortage. If at any point, there is any concern about the quantity or state of the cargo the responsible officer should start collecting evidence. Taking pictures is highly recommended.	
THE DECK LOGBOOK The following items must be recorded in the deck logbook: ▪ commencement of cargo operations ▪ end of cargo operations ▪ weather conditions ▪ number of stevedores working gangs ▪ stevedore working times, including normal breaks or breaks because of incidents (for instance weather circumstances) ▪ safety briefings ▪ incidents that occurred during the watch, for instance cargo damage Instructions for transfer of duties with respect to: ▪ ballast operations (trim, maximum draft, forces) ▪ cargo operations ▪ when to call the master	

3.8.3 CARGO GEAR. CRANE MARKING.

Маркировка грузовых стрел и кранов. Основные названия деталей грузового устройства на английском языке.

MACGREGOR HATCH COVERS

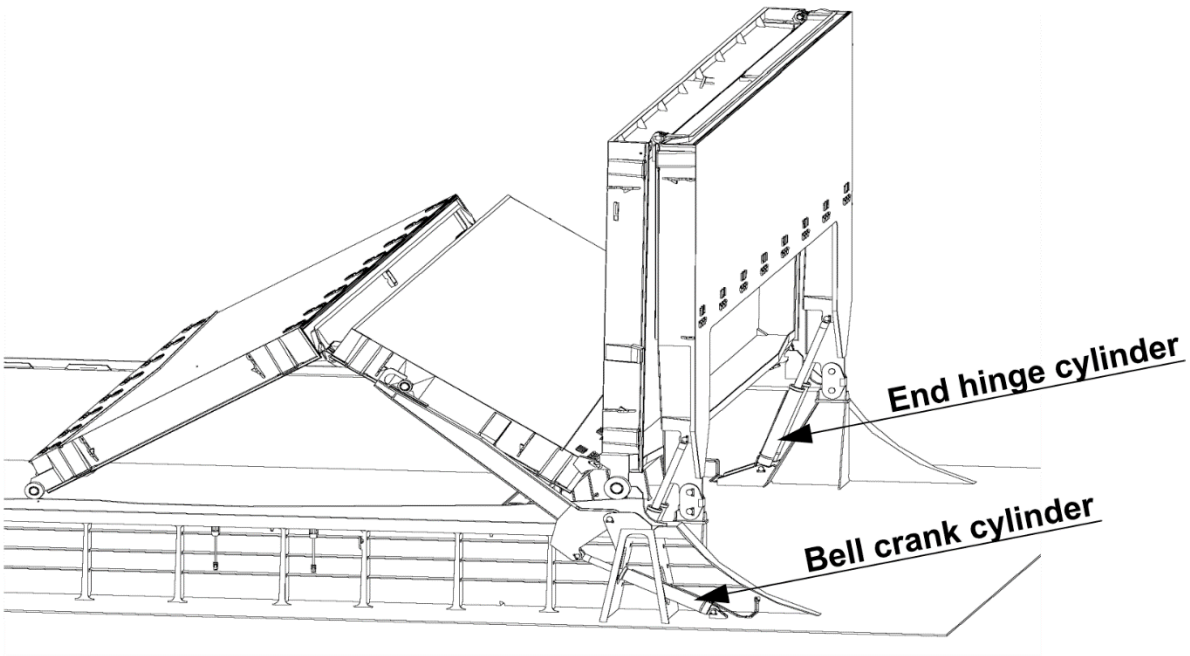


Figure 3.8.3.1. MacGREGOR hatch covers [3.8]

Leading pair	First pair of panels, first panel is linked to the coaming by end hinge
Trailing pair	Second pair of panels, linked to the leading pair, operated by a bell crank
Hatch No. 1 dimensions	Clear Opening L x B (mm) – 35,860 x 17,766 Number of Panels (Fore + Aft) – 4 + 0
Hatch No. 2 dimensions	Clear Opening L x B (mm) – 52,160 x 17,766 Number of Panels (Fore + Aft) – 2 + 4
Operating Time	Opening / closing time for each folding pair (excluding time for operation of manual cleats) is approximately 4 / 4 minutes. Only one panel pair can be operated at a time. The operator can control the speed of the hatch cover by varying the stroke of the control valve lever. Operating times are based on pipe dimensions and hydraulic oil viscosity according to MacGREGOR's recommendations and are valid at an ambient temperature of 20 °C. Operation times are increased at lower temperatures.

LIEBHERR CRANES

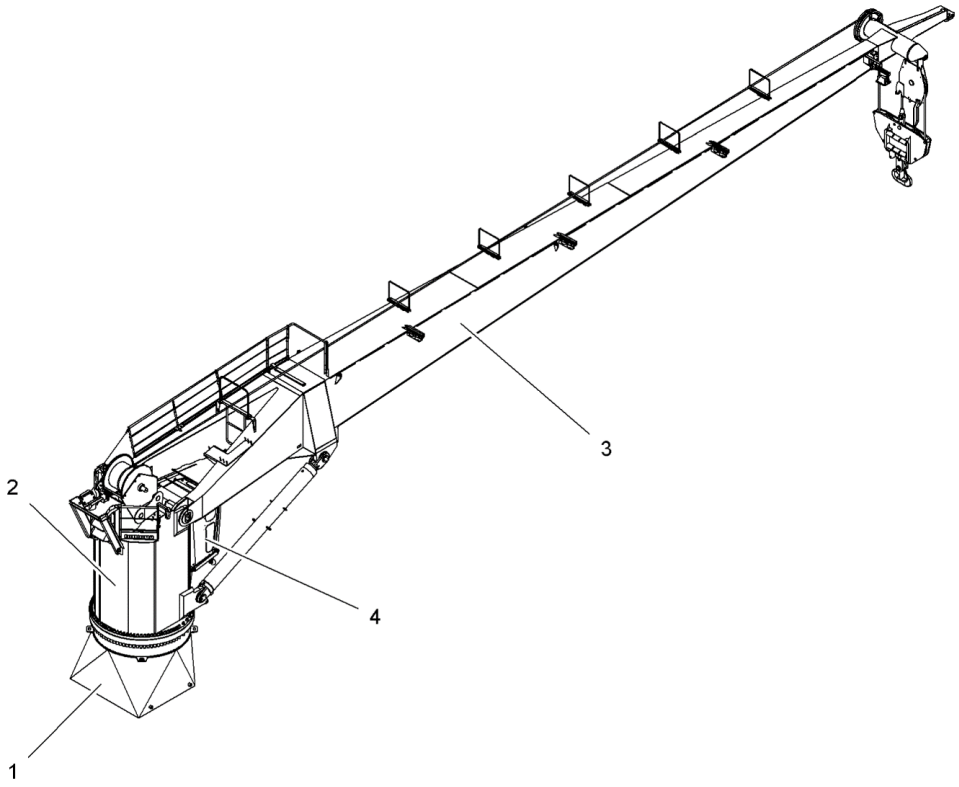


Figure 3.8.3.2. Cargo crane [3.8]
1 – Base column, 2 – Slewing column, 3 – Boom, 4 – Operator's cabin

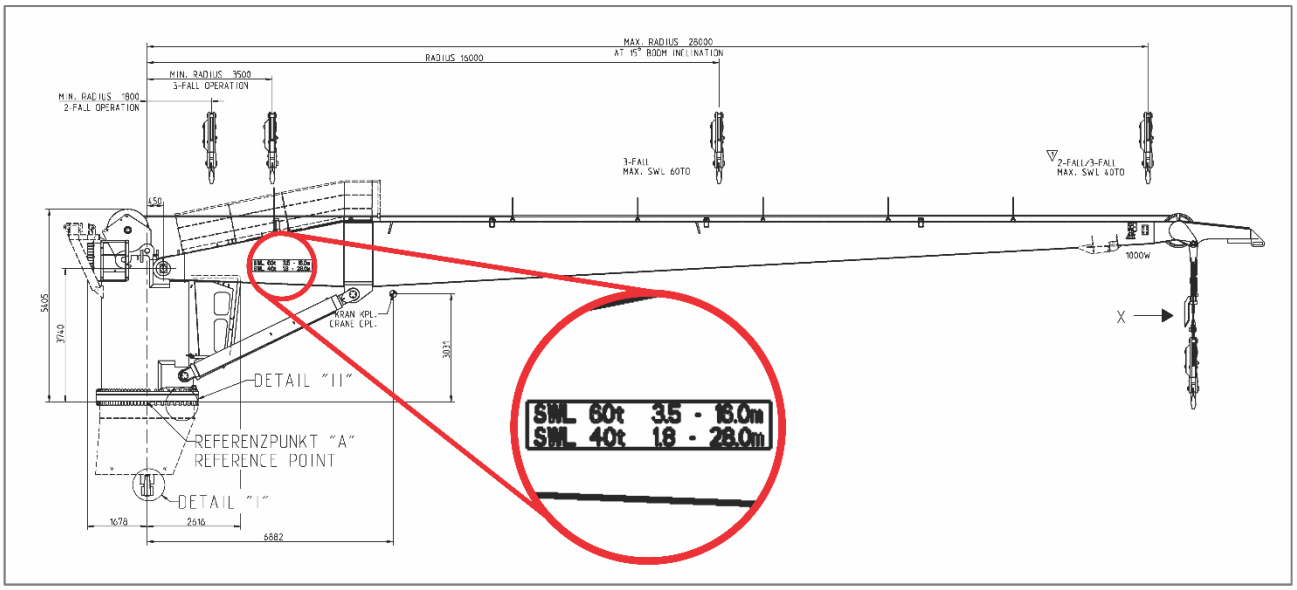


Figure 3.8.3.3. Cargo crane marking [3.8]

Reeving	2-fall	3-fall
Maximal hoisting capacity	40 t SWL	60 t SWL
Hoisting speed	0 − 22 m/min with 40 t SWL 0 − 35 m/min with empty hook	0 − 14 m/min with 60 t SWL 0 − 23 m/min with empty hook
Radius	1.8 – 28 m	3.5 – 16 m

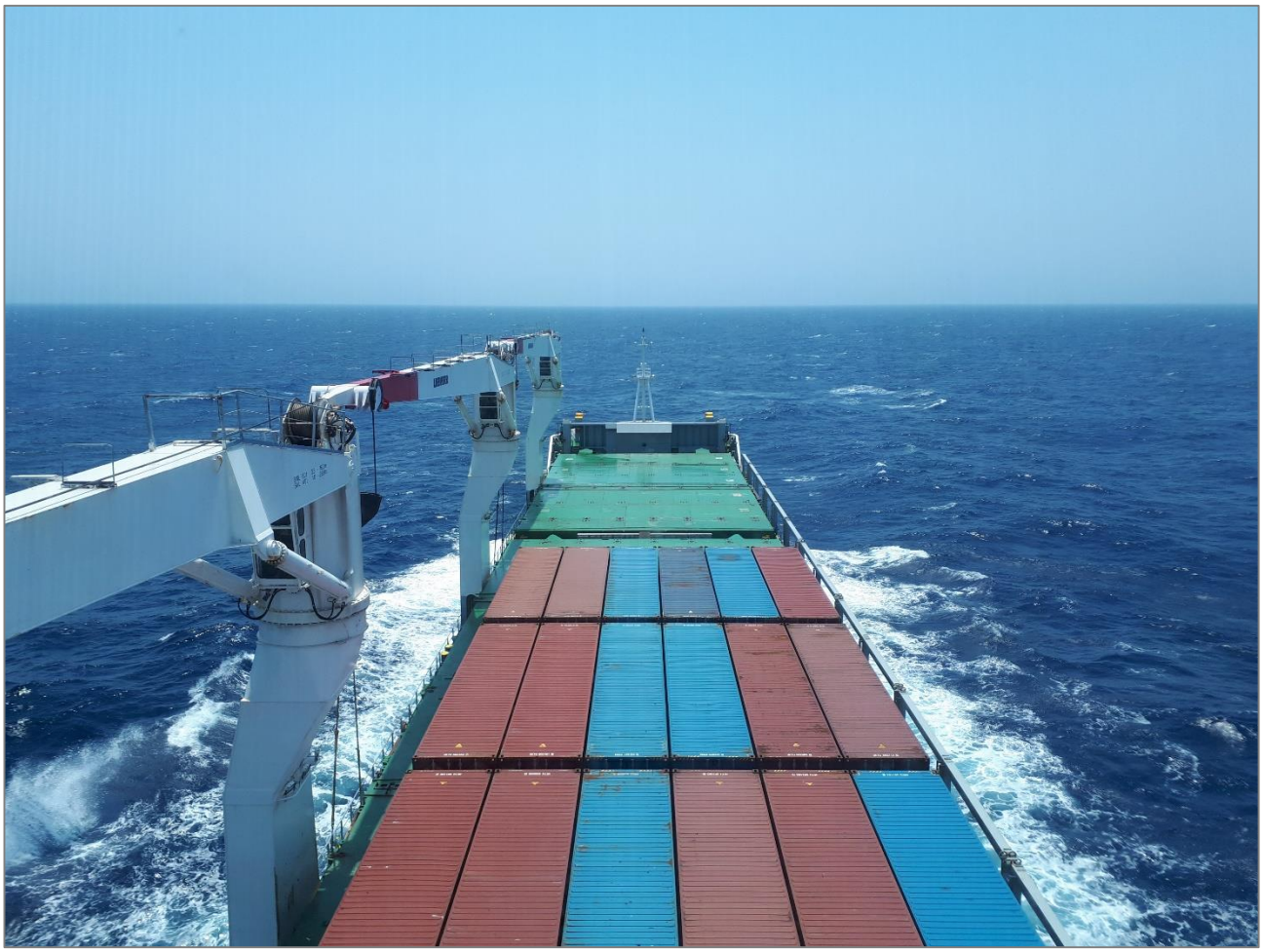
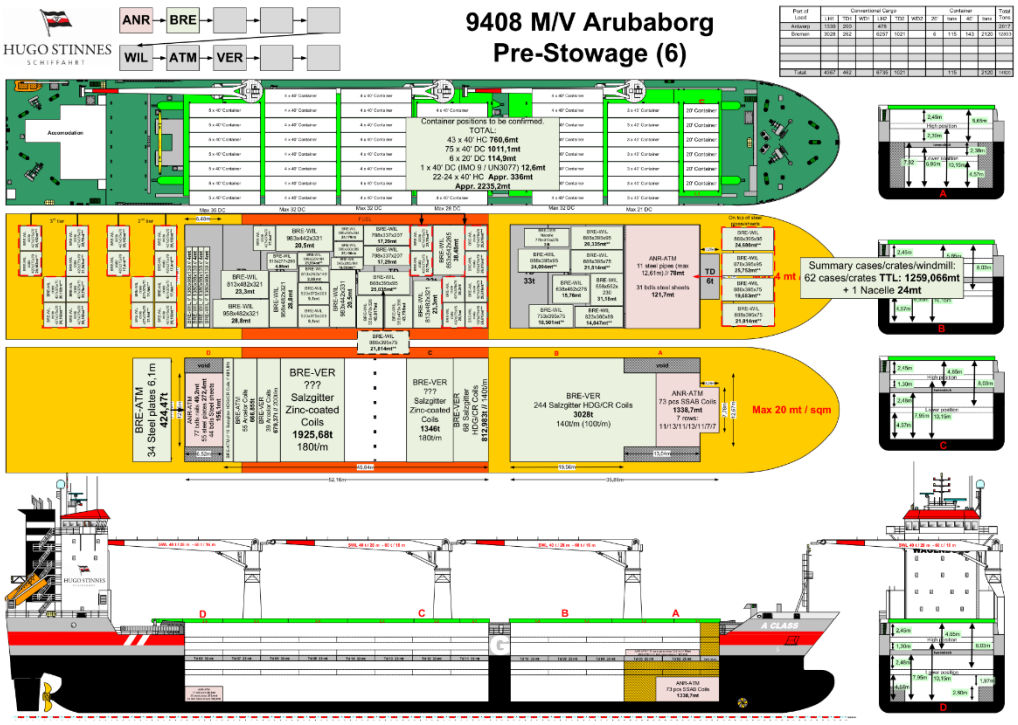


Figure 3.8.3.4. Cargo gear – Hatch covers and cranes [3.8]

3.8.4 LOADING AND DISCHARGING CARGO

Технология погрузки и выгрузки конкретного груза на судне

CARGO LOADING PROCEDURE

Stage	Description	*Reference*
1	**BEFORE LOADING**	
	STOWAGE PLAN A preliminary stowage plan is made and sent to the vessel from the charterer according to the chartering information, in which indicates the following information: + A drawing showing the holds, their divisions by pontoons and cargo inside + Total amount of cargo + Last cargo + Load rate + Ballast pumping rate + Steps of loading, location and quantity + Ballast operations + Controlling for drafts and trim The preliminary stowage plan is to be discussed with the Master and C/O, before handed over to chief stevedores/ foreman. Example:  	

HOLD PREPARATION: Arranging/ Shifting the pontoons/ tween-decks

After discharging last cargo, there will be hold preparation for the next cargo (project cargoes, steel coils, steel plates).

According to the stowage plan, placing the pontoons to their positions.

When operating with the cranes, there should be good communication with VHF radios for signaling and safety (controlling for positions of hatch-covers, pontoons and emergency stop).

HOLD PREPARATION: Cleaning and drying

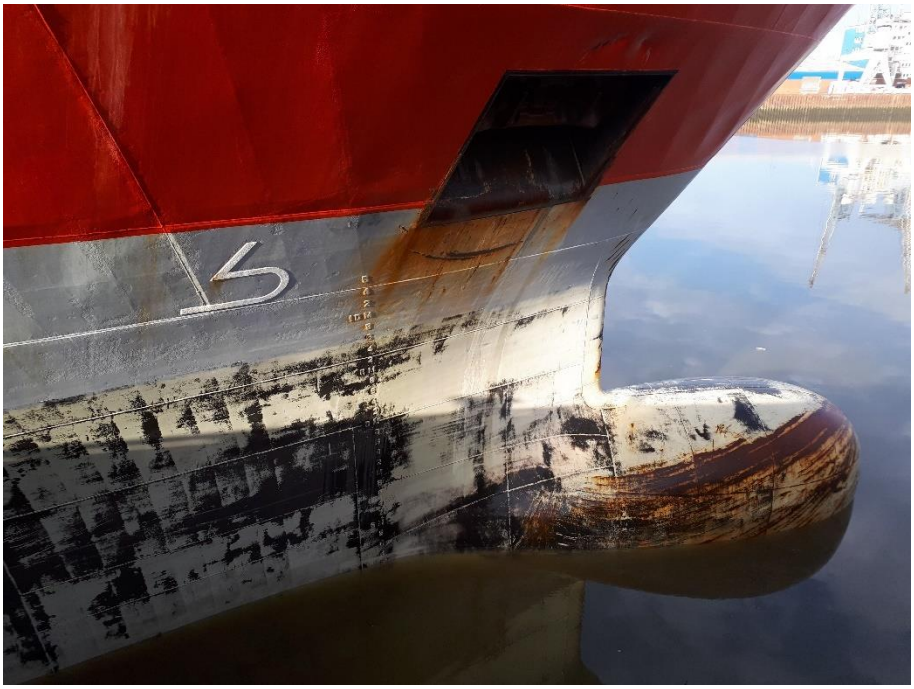
Sweeping all dust, trash and remaining dunnage.
Other further preparations depend on the next cargo's requirements.

According to the requirements in SOM:

+ Holds – in good condition, clean, dry and without smell

	+ Bilge wells – clean and dry + Bilge alarms – tested + Manhole covers – in good condition, no leakage + CO2-releases – checked	
	HOLD PREPARATION: Bilge and Water-tightness There are bilge alarms in holds, which are based on the increasing of pressure when there is water inside the bilge wells Testing bilge alarms (procedure by experience): + Informing the bridge/ the deck office + Using duct tape to temporarily close the alarm pipes + Waiting a moment, if the alarms work properly, there should be sound alarms and notifications on the bridge/ in the deck office + Removing duct tape Checking the water-tightness of hatch-covers and hull entrances.	
	HOLD INSPECTION On the day of inspection, inspectors went inside to check the holds As steel products are to be loaded, a special liquid solution is used to test the presence of salty water on the hatch-covers and the holds' wall.	
2	**DURING LOADING**	
	DECK LOGBOOK During cargo operations, recording following information: + Events and time of cargo operations (start, end, breaks) + Weather conditions + Stevedore (number and working times) + Ballast operations	

Checking the drafts (regularly, minimum 2 times – start and end of the watch)



It is very important to observe and know in advance the weather forecast, in order to:

+ Close the hatch-covers before rains
+ Open when it is dry
+ Plan the loading steps with chief stevedores

CARGO SECURING AND CHECKING

Securing cargoes according to the Cargo Securing Manual.

-

Regularly check the intact and damage conditions of the cargoes, e.g. seals, packing, etc.

BALLAST OPERATION

Ballast operations affect to the stability of the vessel.
Before ballast operations:

- Calculating stability → Master approves
- Recording ballast sequence → Deck logbook

During ballast operations:

	+ There is a white board in deck office showing the recent data for ballast tanks. This ballast board must be updated regularly. + Recording → Deck logbook After ballast operations: + Control for list + Taking drafts, control for trim	
3	**AFTER LOADING**	
	CLOSING HATCH-COVERS Before closing hatch-covers: + Ensure that there are no any objects, which can obstruct and damage to the hatch-covers' rubbers + Inform people on deck about closing hatch-covers After closing hatch-covers: + Closing and securing all the cleats around the hatch-covers + Securing the cranes Generally, preparing for sea passage	
	STABILITY CALCULATIONS Final stowage plan and final stability calculations are issued according to the latest information.	

DURING VOYAGE

Stage	Description	Reference
1	**REGULAR CHECKS** Check the cargos inside the holds and on deck regularly: + Lashings and securing + Damages and displacement	

CARGO DISCHARGING PROCEDURE

Stage	Description	Reference
1	**BEFORE DISCHARGING**	
	PREPARING THE HOLD Unlashing the cranes Opening all the cleats of hatch-covers Opening the hatch-covers as per order 	

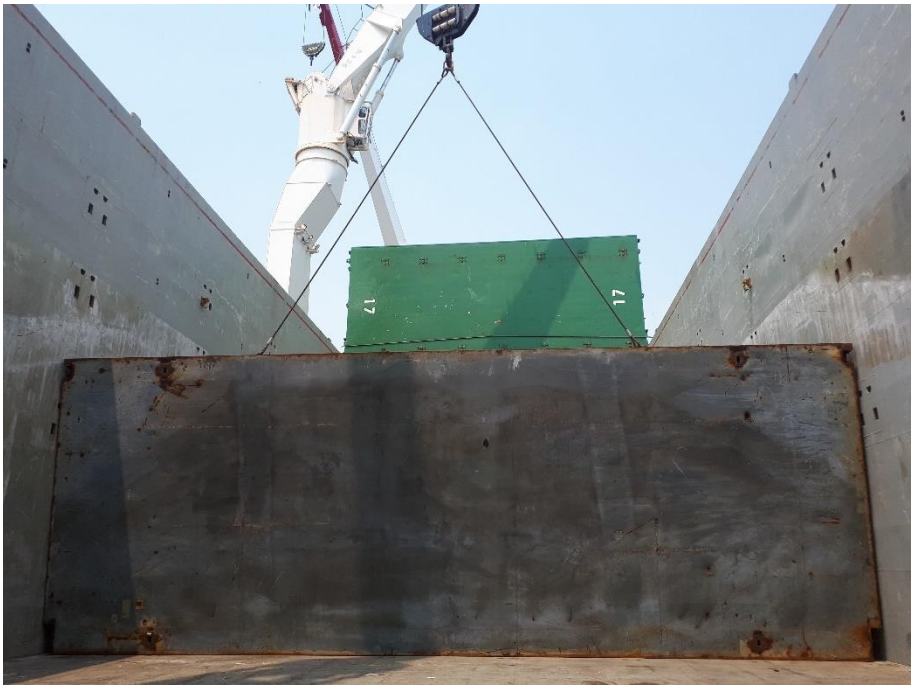
2	**DURING DISCHARGING**	
	DECK LOGBOOK Also recording the events during discharging operation Closing/ opening the hatch-covers depend on the weather condition See to the operation from the shore's stevedore, to make sure there are no damage to the ship and the cargo 	
	BALLAST OPERATION Controlling the drafts and trim by ballast tanks 	

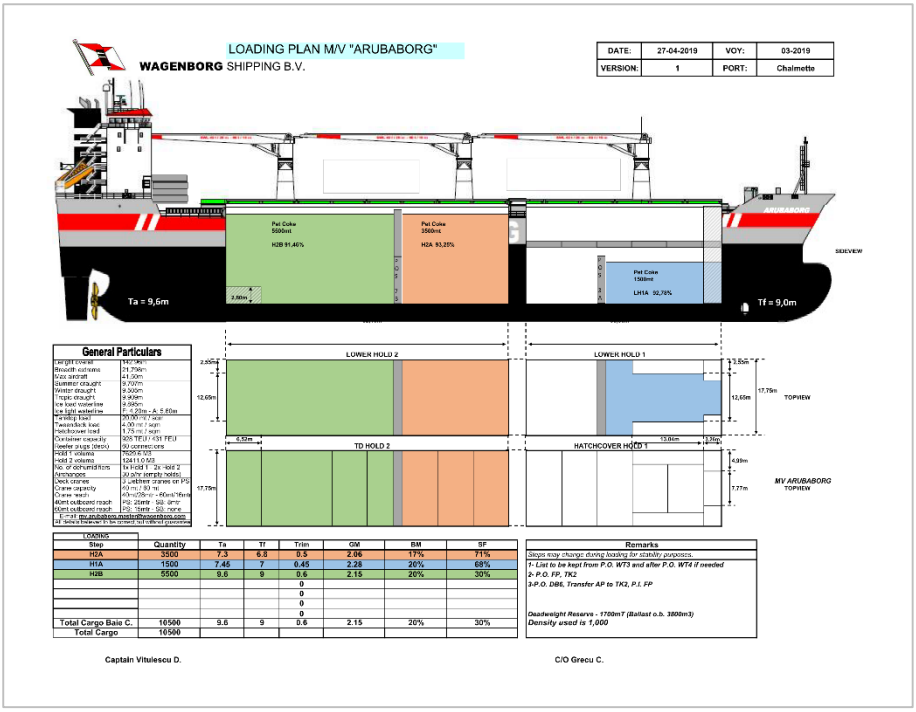
3	**AFTER DISCHARGING**	

HOLD PREPARATION: Placing the bulkheads

After discharging last cargo, there will be hold preparation for the next cargo (pet cokes).

According to the stowage plan, placing the bulkheads to their positions.





3.8.5 LOAD LINES. LOADING SCALE. DRAFT MARKS.

Грузовая марка. Грузовая шкала, пример ее использования. Марки углубления судна. Определение осадки судна. Определение изменения осадки судна в забортной воде различной плотности. Карта районирования океанов и ограничения, накладываемые ею на осадку судна.

LOAD LINES AND LOADING SCALE

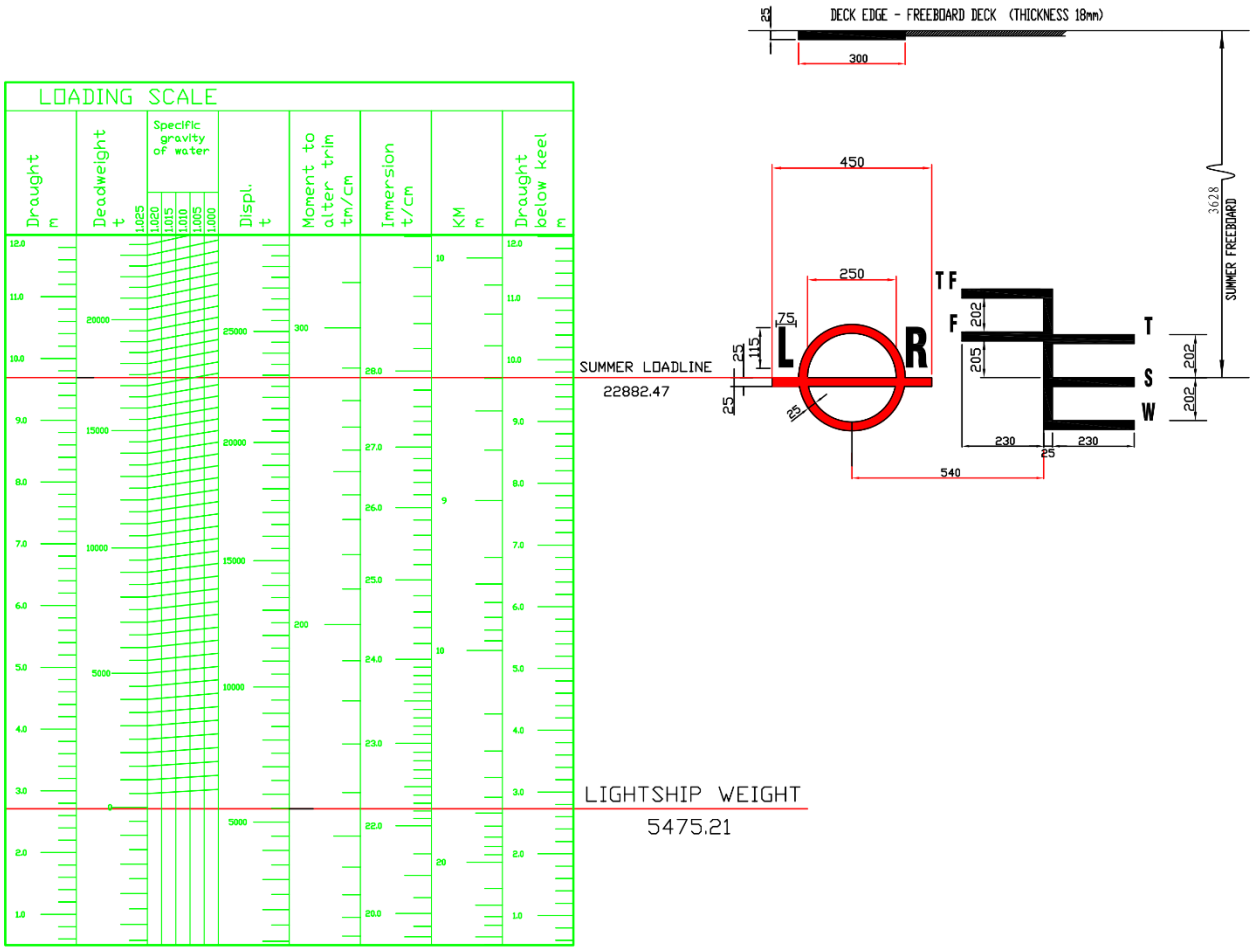


Figure 3.8.5.1. Load-lines and loading scale [3.8]

DRAFT MARKS AND DRAFT READING

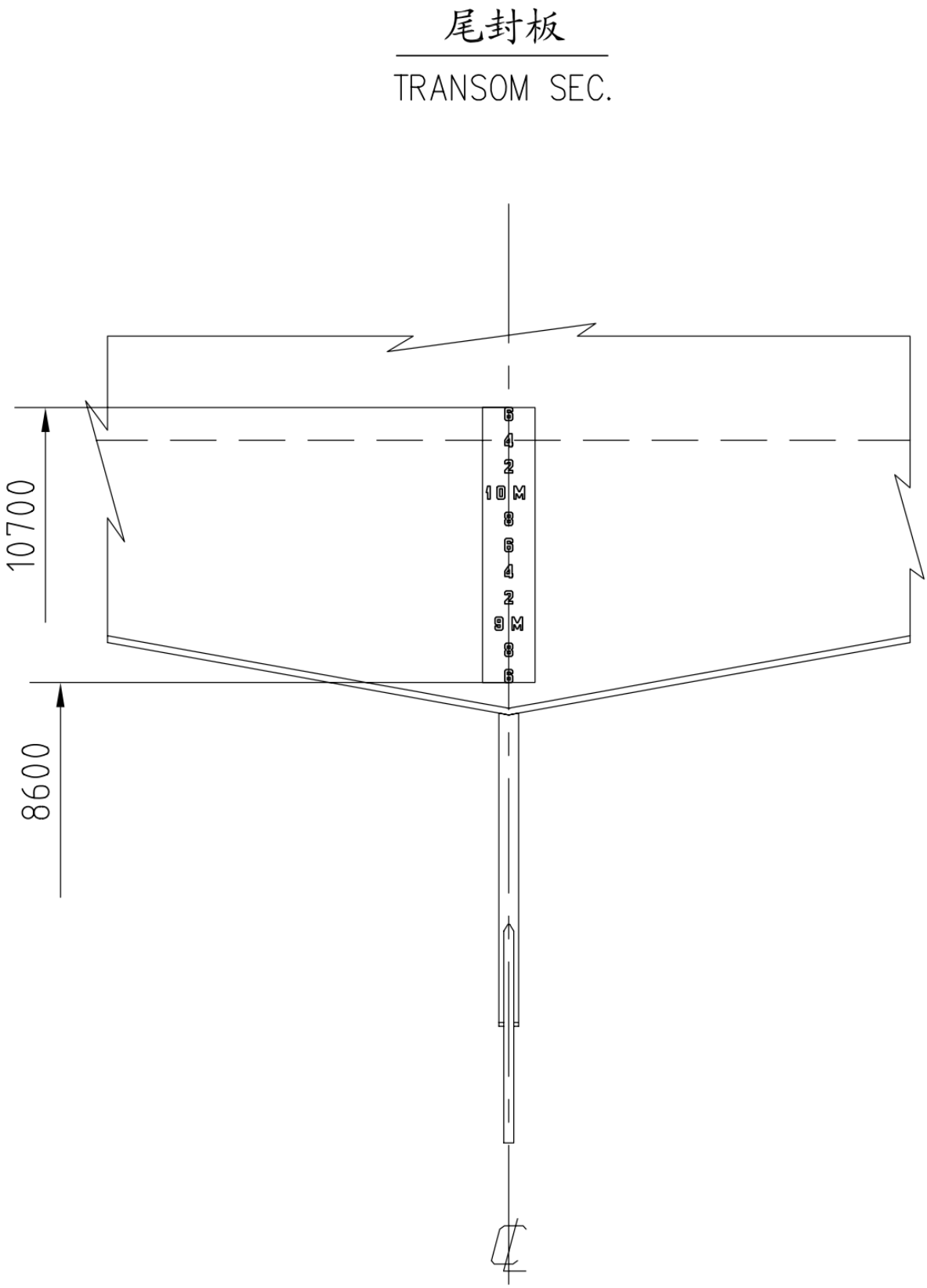


Figure 3.8.5.2. Draft mark (Transom section) [3.8]

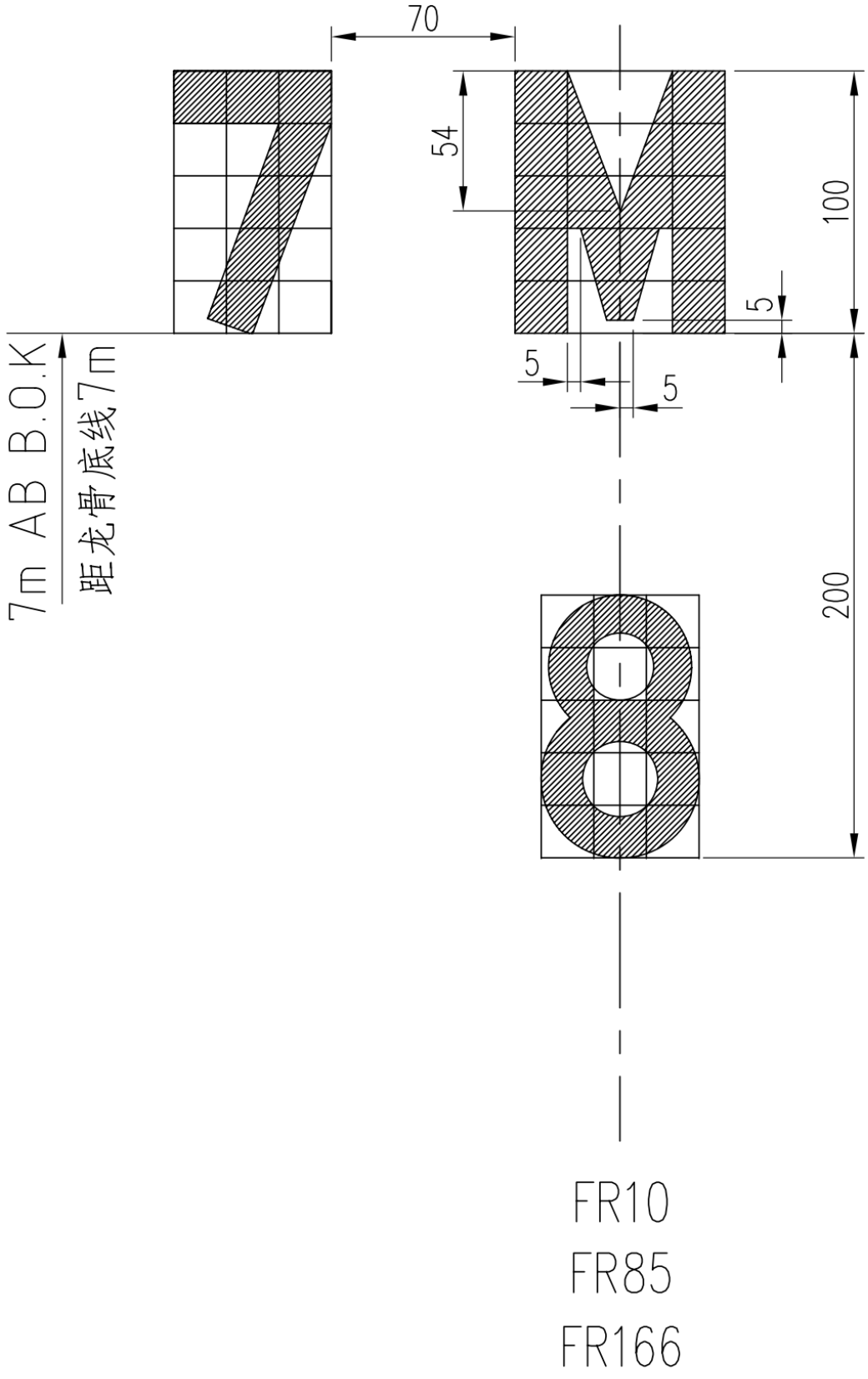


Figure 3.8.5.3. Draft reading [3.8]

INTERNATIONAL LOAD LINE ZONES

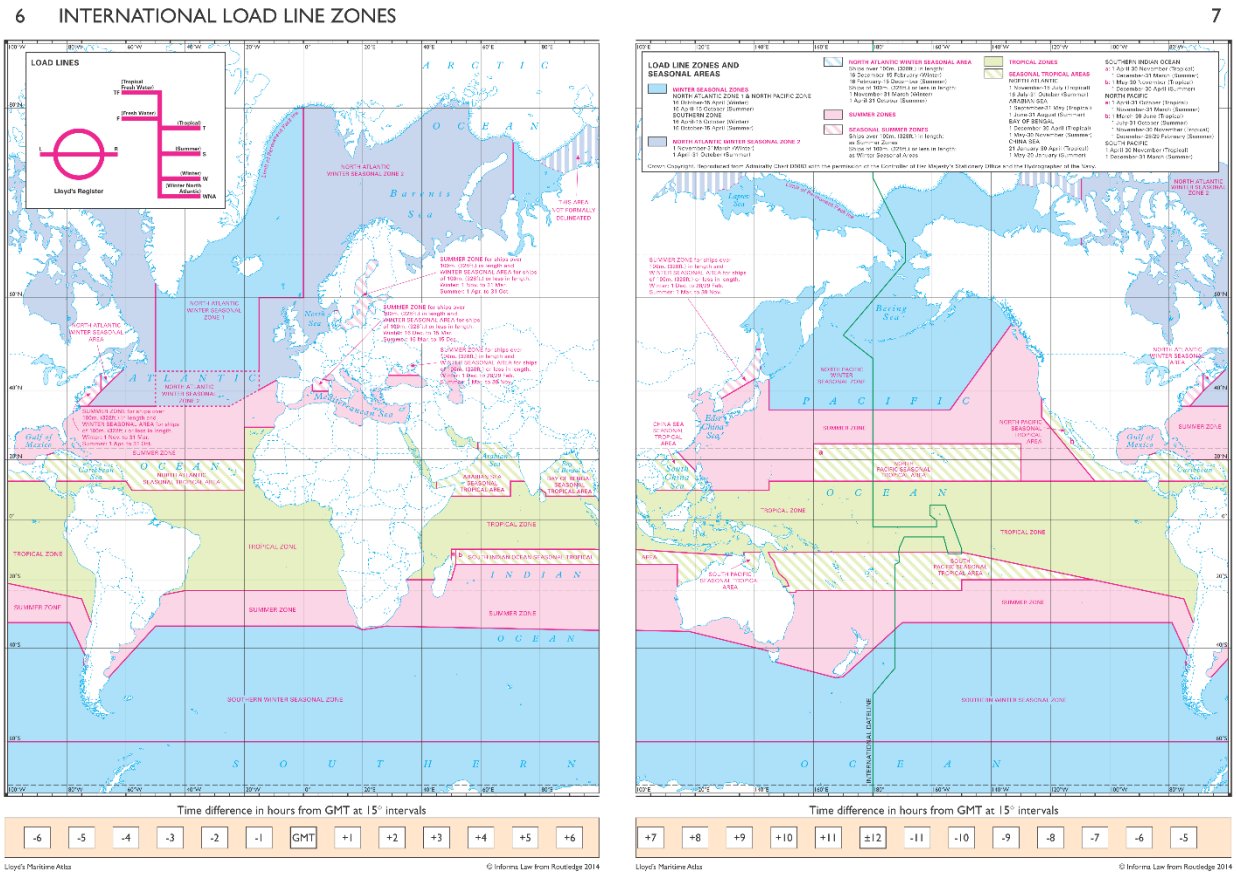


Figure 3.8.5.4. International load line zones [3.8]

3.8.6 CARGO DOCUMENTS

Грузовые документы

No.	Document	Content / Reference
1	Pre-stowage plan Final stowage plan	
2	Stability calculation	
3	Bill of lading	
4	Mate's receipt	
5	Cargo damage report	
6	Statement of fact	

3.9 EMERGENCY SITUATIONS

Мероприятия при аварийных ситуациях

3.9.1 SAFETY FOLDER

Содержание судовой аварийной папки и ее местонахождение

Location	Bridge, Deck office
Contents	Manual Risk assessment form Last minute risk assessment Toolbox talk, Permit to work Safety sheets PPE matrix

3.9.2 EMERGENCY CHECKLISTS

Судовые чек-листы действий вахтенного помощника в чрезвычайных ситуациях (при столкновении, посадке на мель, выходе из строя гирокомпаса и т.п.)

COLLISION

RUSSIAN RONS-89	☑
In case of collision of ships the navigators shall:	
Raise the general emergency alarm.	☐
Perform manoeuvring so as to reduce possible damages to the ship to a minimum.	☐
Make a mark of time on the sheet of the course recorder.	☐
Check whether the water-tight and fire doors are fully closed.	☐
Switch on the deck lights for the hours of darkness.	☐
Determine the ship's position and enter it into the automatic emergency transmitter.	☐
Determine, using precomputations, whether the ship will be afloat.	☐
Provide supervision of damage control and rescue action of the crew: if the vessel will surely sink, the rescue operation must be started immediately.	☐

Communicate on VHF with a colliding vessel and make an inquiry: whether the help is required.	☐
The name, flag, port of register, shipowner, voyage.	☐
Warn the master of the other vessel about the responsibility for collision (in writing or by radiogram).	☐
If immediate assistance is required, – send radiotelegraphic and radiotelephone distress signals.	☐
Transmit a radiogram to the shipping company in due form: maintain continuous communication with the shipping company.	☐

GROUNDING/ STRANDING

RUSSIAN RONS-89	☑
Actions of navigators, when the ship takes the bottom, shall include:	
Having way off (stopping the main engine).	☐
Raising the general emergency alarm.	☐
Checking water-tight and fire-protection doors for closing.	☐
Keeping a VHF radio-station operated on Channel 16.	☐
Determine the ship's position.	☐
Exhibiting lights and shapes according to COLREG-72.	☐
Switching on deck illumination for the hours of darkness.	☐
Examining the hull of the vessel, determining the character and size of damages, starting actions in accordance with the damage control plan, if necessary.	☐
Finding out – in case of holes in the hull – whether the ship will remain afloat after taking itself off the ground.	☐
In case of oil leakage – giving a command to transfer and repump the oil from damaged to intact compartments ensuring the prevention of marine pollution from the ship.	☐
Taking necessary measures to prevent impacts of the vessel against the ground as well as running aground within an area of smaller depths.	☐
Reading the draught of the vessel, estimating the loss of displacement.	☐
Sounding around the vessel, determining a place where the hull has touched the ground.	☐
Sending a radiogram under due form to the shipping company.	☐
Maintaining continuous communication with the shipping company.	☐

GYRO COMPASS FAILURE

RUSSIAN RONS-89	☑
When the gyro compass is out of order, the officer of the watch shall:	
Change over to manual steering.	☐
Set a magnetic compass course for the helmsman.	☐
Report to the master.	☐
Make a mark on the sheet of the course recorder.	☐
Take into account of gyro compass failures when navigational aids are in service.	☐
Check the serviceability and clearance of magnetic compass optical indication, the work of remote electrical transmission.	☐

STEERING GEAR FAILURE

RUSSIAN RONS-89	☑
In case of failure of a steering gear, the officer of the watch shall:	
Arrange changing over to a 'stand-by' gear or to an emergency steering gear.	☐
Inform the watch engineer.	☐
Report to the master.	☐
Stop the vessel when impossible to keep on steering.	☐
Exhibit a signal according to Rule 27 (a) of COLREG-72.	☐
Give a sound signal according to Rule 35(c) of COLREG-72 when in restricted visibility conditions.	☐
Make anchors ready for dropping when near to dangers.	☐
Make a mark on the course recorder sheet.	☐

ENGINE TELEGRAPH FAILURE

RUSSIAN RONS-89	☑
When the main engine remote control or ship's telegraph is out of order, the officer of the watch shall:	

Hand over the main engine control to the engine room.	☐
Inform the watch engineer of the situation, establish a kind of "stand-by" communication.	☐
Report to the master.	☐

BLACKOUT WHEN UNDERWAY

RUSSIAN RONS-89	☑
When the power is off in the vicinity of dangers to navigation, the navigators shall:	
Check the manual mode operation of the steering gear powered by an emergency diesel generator while the generator is in operation.	☐
Arrange the change-over to emergency steering from the steering room, if necessary.	☐
Report to the master.	☐
Exhibit two balls or switch on two red lights according to Rule 27 (a) of COLREG-72.	☐
Continue to monitor ship's movement.	☐
Steer the ship away from the nearest danger to navigation, away from a course of another vessel, to a possible place of anchoring, provided that the ship has a sufficient inertia for these purposes.	☐
Make the anchors ready for dropping.	☐
Switch over the power supply of navigating lights to the emergency power source.	☐
Start to give sound signals in restricted visibility conditions according to Rule 35(c) of COLREG-72.	☐
Notify all vessels and the VTS through a VHF radio-station.	☐
Determine the ship's position.	☐
Switch on an echo sounder and the radar.	☐
Establish communication with the engine room using battery-operated telephone.	☐

DISPLACEMENT OF CARGO

RUSSIAN RONS-89	☑
In case of displacement of cargo (a sudden significant list), navigators shall:	
Raise the general emergency alarm, give a command to keep the bow against the sea-way, slow down the speed, keep a VHF radio-station switched on Channel 16.	☐

Check the water-tight and fire-protection doors for closing.	☐
Make tight the rooms, ventilation and other openings water-tight, first of all dealing with the side to which the ship has listed.	☐
Determine ship's position, enter it into an automatic emergency transmitter.	☐
Switch on deck illumination for the hours of darkness.	☐
Check condition and fastening of cargo, determine the causes of listing (heeling), the possibility to set the ship on an even keel.	☐
Send a radiogram in due form to the shipping company.	☐
Maintain continuous communication with the shipping company.	☐
Send radiotelegraphic and radiotelephone distress signals, if the ship is in need of immediate assistance.	☐

DAMAGE TO EQUIPMENT

RUSSIAN RONS-89	☑
When hydraulic engineering structures, crane equipment, berthed vessels are damaged by the ship, navigators shall:	
Examine any caused and sustained damages, take photographs, if possible.	☐
Call the representatives of the port and the authorities.	☐
Reflect in a survey certificate or in an inspection certificate the following items: character and size of damages (besides, one should make it sure that these damages were not sustained earlier), adequacy of illumination, color contrast of a structure etc.	☐
Take evidence of the watchkeeping personnel and other witnesses including the pilot and captains of towboats.	☐
Send appropriate information to the shipping company.	☐
Supervise entries in the ship and engine room logbooks, specify hydrological and meteorological conditions, number and operations of towboats, communication with them, effect of the unforeseen factors etc.	☐
If an accident has taken place when the ship is leaving a port, – act in view of the recommendations of the agent and shipping company and carry out all above-stated recommendations, if there are no claims, – whenever possible take confirmation of it from the authorities in written form.	☐

3.9.3 ON-BOARD EMERGENCY DRILLS

Организационные мероприятия по подготовке экипажа к действиям в аварийных ситуациях. Сроки их проведения.

No.	Emergency drill	Frequency
1	Abandon ship	Every month
2	Recovery of persons from the water	Every month
3	Fire	Every month
4	Enclosed space entry and rescue	Every 2 months
5	Pollution prevention	Every 3 months
6	Emergency steering	Every 3 months
7	Serious injury and transportation	Every year
8	Collision/serious damage/excessive list	Every year
9	Grounding/stranding	Every year
10	Black out under critical circumstances	Every year
11	Launch of FFB into the water	Every 3 months
12	Lowering of the rescue boat into the water	Every month
13	Demonstration lowering of crane launched rafts	Every 4 months

3.9.4 FREE-FALL LIFEBOAT

Фото спасательной шлюпки, маркировка и порядок ее спуска

FFB

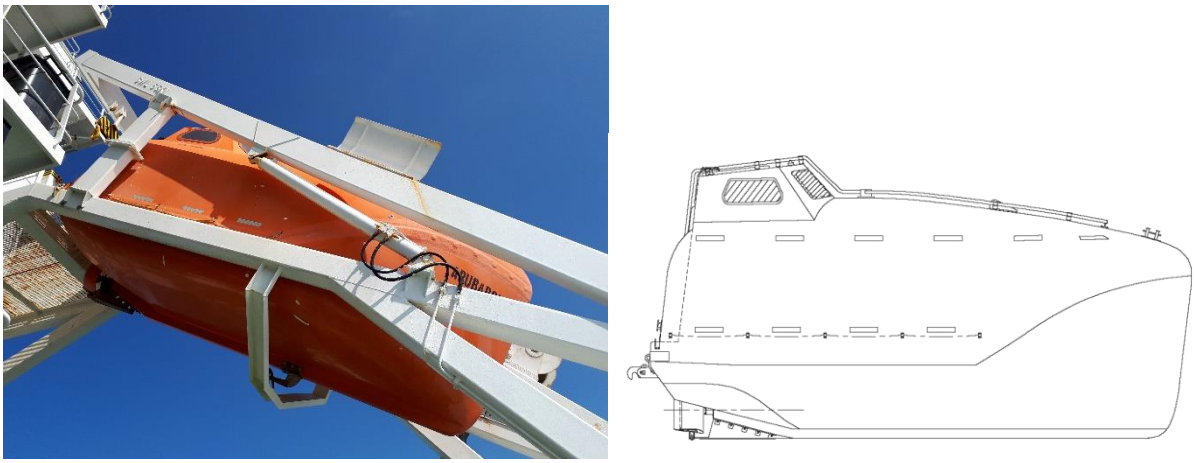


Figure 3.9.4.1. FFB [3.9]

FFB MARKING

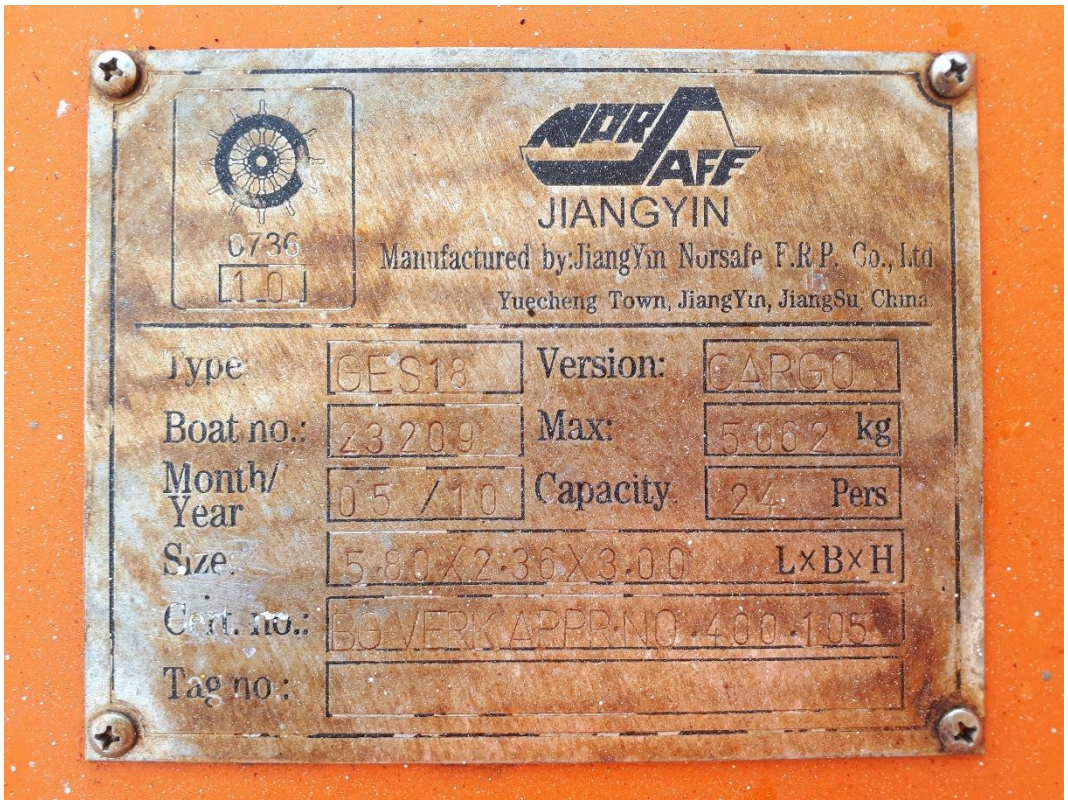


Figure 3.9.4.2. FFB marking [3.9]

Technical specification

Dimensions (overall)	Length : 5.80 m Beam : 2.35 m Height : 3.16 m
Construction	Fire-retardant Glass-fiber Reinforced Polyester (GRP)
Capacity	Maximum 25 persons
Weight (approx.)	Empty Boat : 3,260 kgs Total Davit load (25 persons) : 5,135 kgs
Speed (minimum)	6 knots
Max. Installation Height	15 m
Colour	Safety Orange
Certification	This craft has been approved and certified under SOLAS Resolution MSC 81 (70) as amended.

LAUNCHING PROCEDURES

NORMAL Free-fall launching mode	☑
Before attempting any free-fall launch it is vital that the crew of the craft ensures that the boat will achieve a clean unrestricted path down the skidway and that the launch zone is clear of obstructions. The following checks should be made before commencing free-fall launch mode:	
1. Lowering/retrieval hooks have been disconnected from the lifeboat lifting slings and the slings are securely stowed on top of boat. The boat shall always have the lifting sling disconnected, leaving boat ready for immediate use in an emergency.	☐
2. Lashing arrangement has been disconnected.	☐
3. All ropes etc. are clear of the lifeboat and launching ramp.	☐
4. Electrical plug on outside of lifeboat has been disconnected.	☐
5. Steering nozzle is in mid/straight forward position.	☐
6. All hatches and openings are securely closed.	☐
7. All personnel are seated and have fastened safety harness.	☐
8. Battery switch is turned to “ON” position.	☐
9. Helmsman confirms that all hatches, doors and openings are closed.	☐

10.	Helmsman removes safety pin on free-fall release system and lifts the safety lever up and forward in the boat.	☐
11.	Helmsman confirms that landing area is clear.	☐
12.	Helmsman starts engine in neutral position.	☐
13.	When ready to launch, helmsman instructs person sitting in front of main release wheel to release the boat. This person then turns the wheel counter-clockwise to release the boat. The boat will be released after just over two complete turns of the wheel. If sudden resistance is felt, turn the wheel back again (clockwise) before checking if the safety pin AND safety lever has been removed, if not, remove and try again. If the wheel still does not turn, commence the emergency launching procedure.	☐
14.	After launch helmsman engages the propeller and steers craft away from danger.	☐
15.	All personnel shall remain in their seats unless instructed otherwise by the crew of the lifeboat.	☐

EMERGENCY Free-fall launching mode		☑
If a free-fall launch has been unsuccessfully attempted using the main release wheel, proceed as follows:		
1.	Turn the wheel clockwise back to starting point.	☐
2.	Make sure two persons are seated at the back row, one each side of the door.	☐
3.	Disconnect the cable, coming from the main release wheel, from the free-fall release lever. This lever is between the door frame and the step just inside the door. Disconnect cable by pulling out the split pin and remove the bolt it went through. The cable should now be free from the free-fall release lever.	☐
4.	Take out the Emergency release arm and fit it over the end of the free-fall release lever.	☐
5.	All persons take up proper seats.	☐
6.	Release boat by pushing emergency release arm sideways in the boat. It has to be turned through 90-100 degrees to release the boat. To do this, the person sitting on port side of the boat starts to turn the arm as far as possible without getting out of his seat. The person on the starboard side of the boat will complete the release.	☐
It is important that boat persons sit back in their seats as far as possible during the operation.		
All other points regarding launching the boat remain unchanged.		

3.9.5 LIFE-RAFTS

Фото ПСН и порядок его спуска, маркировка на контейнере

LIFE-RAFTS

Figure 3.9.5.1. Life-raft [3.9]

LIFE-RAFT MARKING

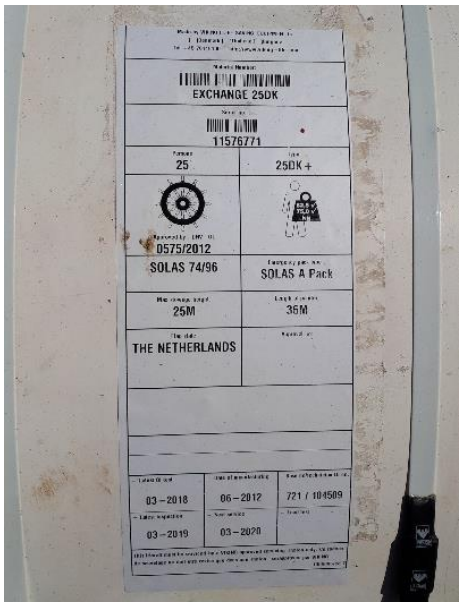


Figure 3.9.5.2. Life-raft marking [3.9]

LAUNCHING PROCEDURES

Embarkation procedure into life-rafts	☑
1. Lower embarkation ladders	☐
2. Check painter and steering lines are connected to the vessels	☐
3. Lift the raft and turn overboard	☐
4. Pull the painter line totally out of the container and inflate the raft by giving a short jerk on the painter line, pull raft alongside with steering and bowsing lines	☐
5. All persons embark into the raft, crane to be operated from inside the raft	☐
6. After embarkation, release all lines, except painter line, lower raft with remove control	☐
7. Release the raft from the crane, cut the painter line	☐
8. When free from ship, use sea anchor, start taking seasickness pills	☐

3.9.6 OOW'S DUTIES IN CASE OF FIRE

Действия вахтенного помощника при получении сообщения о пожаре

RUSSIAN RONS-89	☑
Actions of navigators in case of a fire shall include:	
Raising a fire alarm with indication of the center of the fire.	☐
Giving an order to stop the ship, to set the ship on the drift, if weather and other conditions permit.	☐
Providing a supervision of fire-fighting action of the crew according to the ship's Muster List and the efficient fire control plan.	☐
Switching off ventilation, closing water-tight and fire-protection doors operated by bridge remote control panel.	☐
Switching on deck lights for the hours of darkness.	☐
Fixing the position of the ship, entering it into an automatic emergency transmitter, keeping a VHF radio-station switched on Channel 16.	☐
Sending a radiogram to the shipping company under the form prescribed.	☐
Maintaining continuous communication with the shipping company.	☐
Sending radiotelegraphic and radio (telephone distress signals, if the ship needs assistance immediately.	☐

3.9.7 MAN OVERBOARD

Порядок действий вахтенного помощника при получении сообщения "Человек за бортом". Все известные схемы маневрирования судна.

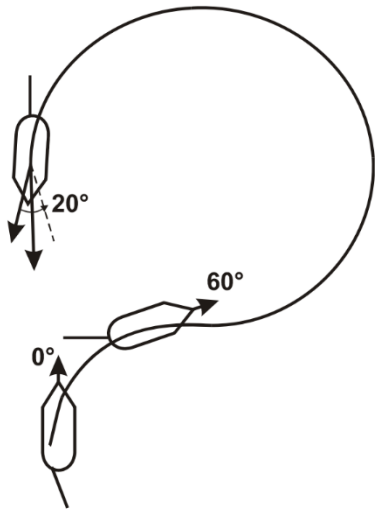
MOB CHECKLISTS

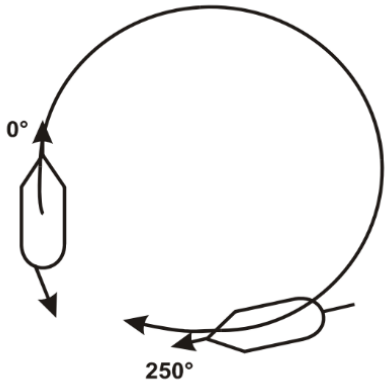
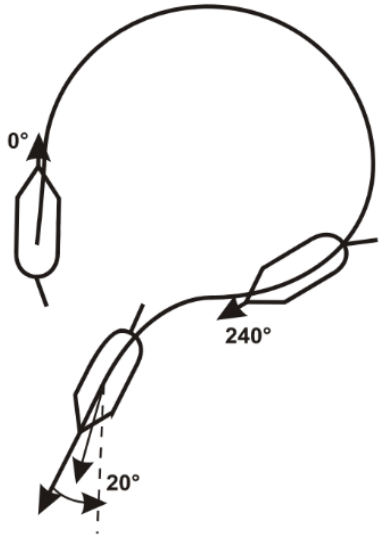
IAMSAR MANUAL, VOLUME III	☑
The officer of the watch, when a person falls overboard, shall:	
Mark and note position and time from GNSS.	☐
Throw a life-ring over the side as close to the person as possible.	☐
Sound three prolonged blasts of ship's whistle, hail "Man overboard".	☐
Commence recovery manoeuvre.	☐
Note wind speed and direction.	☐
Inform the Master and engine room.	☐
Post look-outs to keep the person in sight.	☐
Set off dye marker or smoke flare.	☐
Inform radio operator, keep updated on position.	☐
Stand by the engines.	☐
Prepare recovery equipment.	☐
Distribute portable VHF radios for communication between bridge, deck and the rescue boat.	☐

RUSSIAN RONS-89	☑
The officer of the watch, when a person falls overboard, shall:	
Order the helmsman to change over to manual steering, start to perform the manoeuvre "Man Overboard" with a deviation of about ± 60 degrees from the original course, and further give the command "Starboard (Port) the helm" to the helmsman in order to settle the ship on the contra-course.	☐
Release a life buoy.	☐
Come back to the wheelhouse, sound the alarm supervising simultaneously the helmsman's course reports (the master need not be notified as he will come up on the bridge on hearing the alarm signal).	☐

With settling on the heading which has deviated about ± 60 degrees from the original course, – give a command to put the rudder over to the opposite side (without restraining), give to the helmsman a contra-course to follow (the watch engineers should know that in the case of the "Man Overboard" alarm they shall slow down the speed of the vessel taking into account the stopping force induced by the hull at circle manoeuvre).	☐
Watch the man overboard (lifebuoy with light and smoke).	☐
With arrival of the master on the bridge:	
Broadcast the number of the boat to be launched.	☐
Post lookouts.	☐
Exhibit a signal "Oscar".	☐
Switch on a VHF radio-station on Channel 16 and send appropriate notices.	☐
Determine the ship's position and inform the radio-house of the position of the man overboard.	☐
Plot the position of the man on the chart and make carefully dead reckoning using a manoeuvre plotting sheet of the scale that is ten times larger than that one in the usual case, if necessary, to allow for manoeuvring.	☐
Switch on searchlights during the hours of darkness.	☐
Perform the manoeuvre "Man Overboard", some other methods are possible to apply.	☐

STANDARD RECOVERY MANOEUVRES

No.	Manoeuvre	Example
1	**WILLIAMSON TURN** *Features:* ▪ Makes good original track line ▪ Good in reduced visibility ▪ Simple ▪ Takes the ship farther away from the scene of the incident ▪ Slow procedure *Manoeuvring:* 1. Rudder hard over (in an "immediate action" situation, only to the side of the casualty). 2. After deviation from the original course by 60°, rudder hard over to the opposite side. 3. When heading 20° short of opposite course, rudder to midship position and ship to be turned to opposite course.	

2	**ANDERSON TURN** (One turn, Single turn, 270° manoeuvre) *Features:* ▪ Fastest recovery method ▪ Good for ship with tight turning characteristics ▪ Used most by ships with considerable power ▪ Very difficult for a single-screw vessel ▪ Difficult because approach to person is not straight *Manoeuvring:* 1. Rudder hard over (in an "immediate action" situation, only to the side of the casualty). 2. After deviation from the original course by 250°, rudder to midship position and stopping manoeuvre to be initiated.	
3	**SCHARNOV TURN** *Features:* ▪ Will take vessel back into her wake ▪ Less distance is covered, saving time ▪ Cannot be carried out effectively unless the time elapsed between occurrence of the incident and the commencement of the manoeuvre is know ▪ **Not to be used in an "immediate action" situation** *Manoeuvring:* 1. Rudder hard over. 2. After deviation from the original course by 240°, rudder hard over to the opposite side. 3. When heading 20° short of opposite course, rudder to midship position so that ship will turn to opposite course.	

3.9.8 ON-BOARD WATER FIGHTING

Действия вахтенного помощника при получении сообщения о поступлении заборной воды в грузовые помещения

OOW's duties when the vessel is flooding	☑
Immediately inform the Master and C/O	☐
Raise an alarm	☐
Use all means available to stop the water	☐
Control the stability of the vessel	☐

3.9.9 IAMSAR

Знание содержания Международного авиационного и морского наставления по поиску и спасению (IAMSAR), том 3

THE INTERNATIONAL AERONAUTICAL AND MARITIME SEARCH AND RESCUE MANUAL (IAMSAR MANUAL)

No.	Volume	Contents
1	Volume I – Organization and Management	
2	Volume II – Mission Coordination	
3	Volume III – Mobile Facilities	Section 1 – Overview Section 2 – Rendering assistance Section 3 – On-scene coordination Section 4 – On-board emergencies Section 5 – Multiple aircraft SAR operations

3.9.10 LIFE-SAVING APPLIANCE INSPECTIONS

Обязательные проверки аварийно-спасательного оборудования и их сроки

THE INTERNATIONAL LIFE-SAVING APPLIANCE CODE

No.	Frequency	Tests/ Inspections
1	Weekly	Visual inspection: Life-rafts, FFB, rescue boat, launching appliances, hooks, on-load release gear Engines in survival boats run in ≥ 3 minutes General emergency alarm test *EEBD* *BA sets*
2	Monthly	Lifeboats, except FFB, launching test (without any persons) *ALDIS lamp, Morse light* *Lifebuoys* *Pyrotechnics*
3	Yearly	Every inflatable life-raft, inflatable lifejacket, marine evacuation system Hydrostatic release units (HRU)

3.10 SAFETY MANAGEMENT SYSTEM (SMS)

Система управления безопасностью (СУБ)

3.10.1 COMPANY POLICIES

Политика судоходной компании, ее содержание

INTERNATIONAL SAFETY MANAGEMENT (ISM) CODE

1. GENERAL

1.4. Functional requirements for a safety management system

Every Company should develop, implement and maintain a safety management system which includes the following functional requirements:

No.	International Safety Management (ISM) Code	Wagenborg	Description
1	A safety and environmental-protection policy	☑	
2	Instructions and procedures to ensure safe operation of ships and protection of the environment in compliance with relevant international and flag state legislation	☑	
3	Defined levels of authority and lines of communication between, and amongst, shore and shipboard personnel	☑	
4	Procedures for reporting accidents and non-conformities with the provisions of this code	☑	
5	Procedures to prepare for and respond to emergency situations	☑	
6	Procedures for internal audits and management reviews	☑	

3.10.2 SHIP DOCUMENTS

Документы, выдаваемые судну. Срок их действия.

No.	Ship document/ certificate	Arubaborg	Remark
1	Safety Management Certificate	☑	For a period, which should not exceed five years
2	Copy of ISM Document of Compliance	☑	For a period specified by the Administration which should not exceed five years
3	Endorsement for annual verification		
4	Endorsement for intermediate verification and additional verification (if required)		
5	Endorsement where the renewal verification has been completed and Part B 13.13 of the ISM Code applies		
6	Endorsement to extend the validity of the certificate until reaching the port of verification where Part B 13.12 of the ISM Code applies or for a period of grace where Part B 13.14 of the ISM Code applies		
7	*Interim Document of Compliance*		
8	*Interim Safety Management Certificate*		

3.10.3 INTERNAL AUDITS

Внутренний аудит СУБ судна и его назначение

International Safety Management (ISM) Code	**Wagenborg Shipping**
7. INTERNAL AUDITS *7.1. Companies should carry out internal audits at least once per year to verify whether shore-based and shipboard activities comply with the SMS. These internal verifications should be prepared and conducted in accordance with procedures established by the Company. The procedures should at least consider the following elements:* 1. Responsibilities 2. Competence and selection of auditors 3. Audit scheduling 4. Preparing and planning the audit 5. Executing the audit 6. Audit report 7. Corrective action follow-up	SOM PART 11 – MISCELLANEOUS *4. AUDITS* *4.1. INTERNAL AUDITS* *Internal audits are performed in order to establish whether the management system is implemented and/or whether the system can be improved. In principal, each ship and office department will be visited for an internal audit annually.* *4.1.1 PROGRAM* *[...] The following elements are covered in the checklist:* 1. Policy, organisation and management 2. Management system including review 3. Document control, certificates 4. Procedures and instructions 5. Handing-over, familiarisation of new personnel 6. Maintenance machinery and safety equipment 7. Critical equipment 8. Incidents and accidents, corrective actions, Safety Alerts sent by the Company 9. Internal/external audits, corrective actions 10. Performance management, evaluating personnel 11. Emergency preparedness/drills and training 12. Environmental issues 13. Occupational health, safe working methods 14. Customer requirements 15. Ship’s security

3.10.4 SOPEP

Меры, принимаемые на судне для предупреждения загрязнения моря. SOPEP назначение и краткое содержание.

Figure 3.10.4.1. SOPEP equipment [3.10]

SHIPBOARD OIL POLLUTION EMERGENCY PLAN (SOPEP)

No.	Measure	Amount (pcs.)	☑	Location
1	Scupper plugs	38		SOPEP Locker
2	Portable pump (Pump and air hose) Portable pump (Hand pump)	1 1		SOPEP Locker SOPEP Locker
3	Squeegees	1		SOPEP Locker
4	Saw dust (Bags)	3		SOPEP Locker
5	Shovel	1		SOPEP Locker
6	Absorbent boom (Long) Absorbent boom (Short)	1 3 6		Spill kit SOPEP Locker Yellow box
7	Absorbent material (Large sheet) Absorbent material (Long sheet)	30 30 30		SOPEP Locker Yellow container Yellow container
8	Broom	1		SOPEP Locker
9	Rubber gloves	2		SOPEP Locker

10	Boots	1		SOPEP Locker
11	Eye protection	2		SOPEP Locker
12	Oil dispersant	3		SOPEP Locker
13	Bucket	1		SOPEP Locker
14	Dust pan	3		SOPEP Locker
15	Container drum	2		SOPEP Locker
16	Waste bags	10		SOPEP Locker
17	Portable spill kit (1 Abs and 2 rubber gloves)	1		SOPEP Locker
18	Mop	2		SOPEP Locker
19	Rags (Box)	1		SOPEP Locker

3.10.5 SUPERINTENDENT INSPECTION

Обязанности 3-го помощника капитана при проверке судна суперинтендантом или представителем компаний

SOM PART 14 – BRIDGE – ENGINE ROOM INSTRUCTIONS

2.4. SUPERINTENDENT VISITS ON BOARD

The superintendent strives to visit "his" vessels every 6 months. During the visit, the superintendent discusses all relevant affairs, previous Vessel Inspection Reports, deficiencies, defects, non-conformities, etc. with the senior management. If possible, he visits all spaces on board. After the visit, he makes a Vessel Inspection Report in WALFIS in order to record his findings.

3.10.6 ARRIVAL/ DEPARTURE DOCUMENTS

Документы, необходимые для оформления прихода и отхода судна в российском и иностранном портах. Получение требуемой информации.

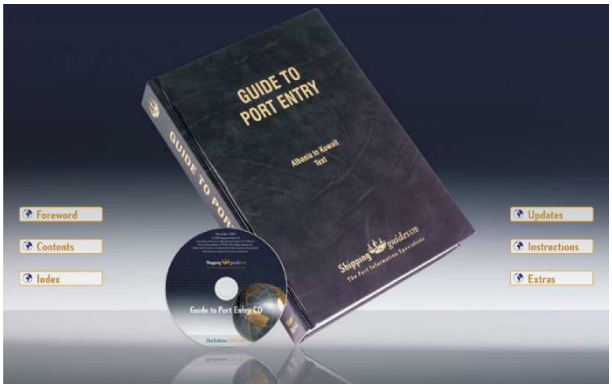


Figure 3.10.6.1. Guide to Port Entry [3.10]

Documents	**Foreign ports**	**Russian ports**
Arrival/ Departure documents	Examples: **THUNDER BAY**, Ontario: 48°25′ N 089°13′ W DOCUMENTS: As inland port, all documentation carried out by Authorities in Montreal, prior arriving. Only when vessels have called at United States Port after departing Montreal, and prior arriving at Thunder Bay, will any changes in documentation be necessary; which will consist of a United States Customs Clearance. Certificates to be available on board: Crew Effects Declaration Customs Clearance 1 Health Certificate QS 2 Immigration papers 3 Ships' Stores. All of the above will have been stamped in Montreal.	Examples: **ST PETERSBURG:** 59°54′ N 030°15′ E DOCUMENTS: The following documents should be prepared by the Master before arrival: 6 Cargo Declarations 2 Crew Effects Declarations 6 Crew Lists 6 General Declarations 1 Maritime Declaration of Health 2 Money Lists (stating currency, name of crew member, position, US Dollars, signature) 1 Passenger List (if any) 3 Ship's Stores Declarations If other documents are needed, Agent will inform Master.
Source of information	Reference: Guide to Port Entry Shipping agencies	Reference: Guide to Port Entry Shipping agencies

3.10.7 SOLAS AND FI-FI MANUALS

Содержание папок "Life saving" and "Firefighting training manual"

No.	Manual	Content
1	SOLAS Training Manual	1. Emergency response 2. Personal protective equipment 3. Survival craft 4. Launching appliances 5. Use of survival craft equipment 6. Radio equipment 7. Pyrotechnics & Line throwing appliances 8. Lifebuoys and attachments 9. Man-overboard recovery 10. Survival 11. Search and Rescue 12. Ship specific details
2	Fire-fighting Training Manual	1. Introduction 2. Portable fire equipment 3. Fixed fire systems 4. Structural fire protection 5. Organization and techniques 6. Fire safety operations 7. Ship specific details

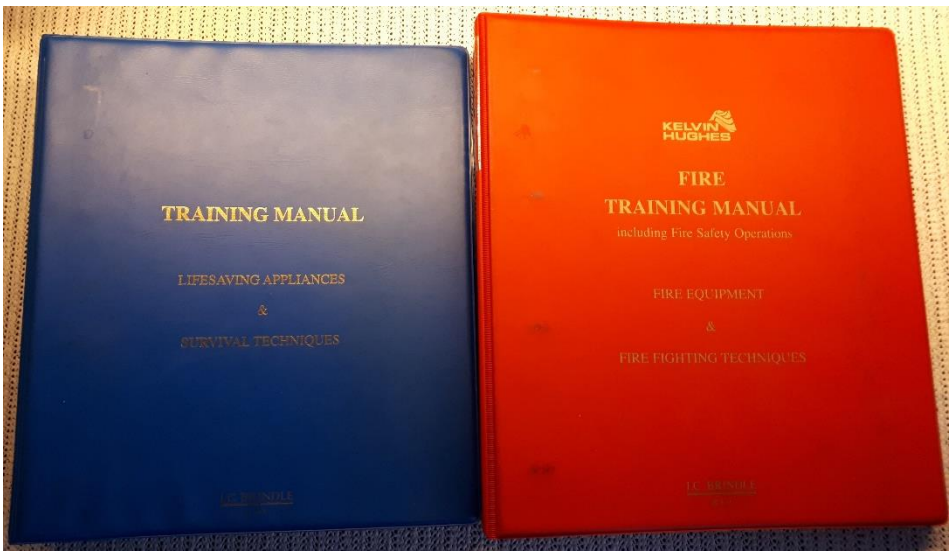


Figure 3.10.7.1. Training Manuals [3.10]

3.11 COLREG

Предупреждение столкновений судов

3.11.1 COLREG CONTENTS

Знание и понимание в полном объеме МППСС–72. Схема правил МППСС–72.

THE CONVENTION ON THE INTERNATIONAL REGULATIONS FOR PREVENTING COLLISIONS AT SEA, 1972

PART A **General**	**PART B** **Steering and sailing rules**			**PART C** **Lights and shapes**	**PART D** **Sound and light signals**	**PART E** **Exemptions**	**ANNEXES**
Rule 1 Application	***Section I - Conduct of vessels in any condition of visibility***	***Section II - Conduct of vessels in sight of one another***	***Section III - Conduct of vessels in restricted visibility***	*Rule 20* Application	*Rule 32* Definitions	*Rule 38* Application	Annex I - Positioning and technical details of lights and shapes
Rule 2 Responsibility	*Rule 4* Application	*Rule 11* Application	*Rule 19* Conduct of vessels in restricted visibility	*Rule 21* Definitions	*Rule 33* Equipment for sound signals		Annex II - Additional signals for fishing vessels fishing in close proximity
Rule 3 General definitions	*Rule 5* Look-out	*Rule 12* Sailing vessels		*Rule 22* Visibility of lights	*Rule 34* Manoeuvring and warning signals		Annex III - Technical details of sound signal appliances
	Rule 6 Safe speed	*Rule 13* Overtaking		*Rule 23* Power-driven vessels underway	*Rule 35* Sound signals in restricted visibility		Annex IV- Distress signals
	Rule 7 Risk of collision	*Rule 14* Head-on situation		*Rule 24* Towing and pushing	*Rule 36* Signals to attract attention		
	Rule 8 Action to avoid collision	*Rule 15* Crossing situation		*Rule 25* Sailing vessels underway and vessels under oars	*Rule 37* Distress signals		
	Rule 9 Narrow channels	*Rule 16* Action by give-way vessel		*Rule 26* Fishing vessels			
	Rule 10 Traffic separation schemes	*Rule 17* Action by stand-on vessel		*Rule 27* Vessels not under command or restricted in their ability to manocuvre			
		Rule 18 Responsibilities between vessels		*Rule 28* Vessels constrained by their draught			
				Rule 29 Pilot vessels			
				Rule 30 Anchored vessels and vessels aground			
				Rule 31 Seaplanes			

Figure 3.11.1.1. COLREG contents [3.11]

3.11.2 DOCUMENTS

Нормативные документы на ходовом мостике судна в соответствии с Правилом 1 МППСС–72 и требованиями Государства флага судна

IN ACCORDANCE WITH COLREG – RULE 1

No.	Document	Remark
1	Ships' Routing	(TSSs)
2		
3		

IN ACCORDANCE WITH DUTCH REQUIREMENTS

No.	Document	Remark
1	Bekendmaking aan de scheepvaart no. 315/1997	
2		
3		

3.11.3 COLREG REGULATIONS. PART B.

Фото с экрана РЛС и оценка ситуации согласно Правилу: 13, 14, 15, 19 (в режимах САРП: Relative; True). Несколько последовательных фото в дневное время (или видеоролик) при расхождении с судном по Правилу 15 МППСС–72.

SECTION I – CONDUCT OF VESSELS IN ANY CONDITION OF VISIBILITY

Rule	Summary	Explanation
4	*Application* **In any condition of visibility**	
5	*Look-out* At all times A proper look-out = sight + hearing + all available means → A full situation and risk appraisal	

6	*Safe speed* At all times A safe speed → Can take proper and effective action → Be stopped within a distance appropriate Factors: (a) By all vessels: (i) Visibility (ii) Traffic density (iii) Vessel's manoeuvrability (stopping distance + turning ability) (iv) Background light at night (v) Wind, sea and current, and navigational hazards (vi) Draught + depth (b) Additionally, by vessels with operational radar: (i) Radar characteristics (ii) Radar range scale (iii) Radar detection effect (iv) Undetected small vessels, ice and other floating objects (v) Detected vessels' amount, location and movement (vi) More exact visibility assessment	
7	*Risk of collision* (a) Use all available means → Determine risk Doubt = Risk existence (b) Use radar → Early risk warning (c) Scanty information → No assumptions (d) Considerations: (i) Approaching vessel bearing = No change → Risk (ii) Approaching a very large vessel/ a tow/ a vessel at close range → Risk (sometimes)	
8	*Action to avoid collision* (a) Any action = In accordance with the Rules + positive + in ample time + good seamanship. (b) Alteration of course/ speed to avoid collision = Large enough → readily apparent visually by radar No succession of small alterations of course/ speed (c) Sufficient sea room	

	→ Alteration of course alone = The most effective action to avoid a close-quarters situation = In good time + substantial + Not result in another close-quarters situation (d) Action to avoid collision → Passing at a safe distance Action effectiveness = Carefully checked → Finally past and clear (e) Necessary → Slacken speed/ Stop/ Reverse means of propulsion (f) (i) A vessel required not to impede the passage/ safe passage → Take early action → Allow sufficient sea room (ii) A vessel required not to impede the passage/ safe passage approaching the other vessel so as to involve risk of collision → Not relieved of this obligation (iii) A vessel the passage of which is not to be impeded → Fully obliged to comply with the Rules of this Part when the two vessels are approaching one another so as to involve risk of collision.	
9	*Narrow channels* (a) Keep as near as is safe and practicable The outer limit of the channel/ fairway → Starboard side (b) A vessel $L \leq 20\ m$ / A sailing vessel → Not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway (c) A vessel engaged in fishing shall → Not impede the passage of any other vessel navigating within a narrow channel or fairway (d) A vessel → Not cross a narrow channel or fairway if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway → The latter vessel → Use the sound signal prescribed in Rule 34 (d) if in doubt as to the intention of the crossing vessel (e) (i) Overtaking in a narrow channel or fairway Only if the vessel to be overtaken has to take action to permit safe passing The vessel intending to overtake → Sound the appropriate signal prescribed in Rule 34 (c) (i) The vessel to be overtaken → In agreement = Sound the appropriate signal prescribed in Rule 34 (c) (ii) and take steps to permit safe passing	

	→ In doubt = Sound the signals prescribed in Rule 34 (d) (ii) This Rule does not relieve the overtaking vessel of her obligation under Rule 13 (f) Nearing a bend or an area of a narrow channel or fairway → Sound the appropriate signal prescribed in Rule 34 (e) (g) Any vessel shall → Avoid anchoring in a narrow channel	
10	*Traffic separation schemes* (a) TSSs adopted by IMO (b) Using a TSSs: (i) In the appropriate traffic lane/ general direction/ traffic flow (ii) Keep clear of a traffic separation line or separation zone (iii) Join/ leave a traffic lane at the termination of the lane Join/ leave from either side → At as small an angle as practicable (c) Avoid crossing traffic lanes If obliged to do so → Cross on a heading as nearly as practicable at right angles (d) (i) Not use an inshore traffic zone but the appropriate traffic lane within the adjacent traffic separation scheme. Vessels < 20 metres, sailing vessels and vessels engaged in fishing may use the inshore traffic zone. (ii) Use an inshore traffic zone when on route to or from a port, offshore installation or structure, pilot station or any other place situated within the inshore traffic zone, or to avoid immediate danger. (e) Only a crossing vessel or a vessel joining or leaving a lane → Enter a separation zone or cross a separation line, or: (i) in cases of emergency to avoid immediate danger; (ii) to engage in fishing within a separation zone. (f) Navigating in areas near the terminations of traffic separation schemes with particular caution. (g) Avoid anchoring in a traffic separation scheme or in areas near its terminations. (h) If not using a traffic separation scheme → Avoid it by a wide margin. (i) A vessel engaged in fishing → Not impede the passage of any vessel following a traffic lane.	

	(j) A vessel < 20 metres or a sailing vessel → Not impede the safe passage of a power-driven vessel following a traffic lane. (k) A vessel restricted in her ability to manoeuvre when engaged in an operation for the maintenance of safety of navigation in a traffic separation scheme is exempted from complying with this Rule. (l) A vessel restricted in her ability to manoeuvre when engaged in a submarine operation, within a traffic separation scheme, is exempted from complying with this Rule.	

SECTION II – CONDUCT OF VESSELS IN SIGHT OF ONE ANOTHER

Rule	Summary	Explanation
11	*Application* **Apply to vessels in sight of one another.**	
12	*Sailing vessels* (a) Two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other as follows: (i) Each has the wind on a different side, the vessel with the wind on the port side → Keep out of the way of the other; (ii) Both have the wind on the same side, the vessel to windward → Keep out of the way of the vessel to leeward; (iii) A vessel with the wind on the port side sees a vessel to windward and cannot determine whether the other vessel has the wind on the port or on the starboard side → Keep out of the way of the other. (b) The windward side = The side opposite to that on which the mainsail is carried or, in the case of a square-rigged vessel, the side opposite to that on which the largest fore-and-aft sail is carried.	
13	*Overtaking* (a) Vessel overtaking → Keep out of the way of the vessel being overtaken. (b) Vessel overtaking = Coming up with another vessel from a direction more than 22.5 degrees abaft her beam, that at night able to see only the stern-light of that vessel but neither of her sidelights.	

	(c) If in any doubt whether overtaking → Assume that this is the case and act accordingly. (d) Any subsequent alteration of the bearing between the two vessels → Not make the overtaking vessel a crossing vessel or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.	
14	*Head-on situation* (a) Two power-driven vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision → Each shall alter her course to starboard so that each shall pass on the port side of the other. (b) A situation deemed to exist = A vessel sees the other ahead or nearly ahead and by night, sees the masthead lights of the other in a line or nearly in a line and/or both sidelights. (c) (c) If in any doubt whether such a situation exists → Assume that it does exist and act accordingly.	
15	*Crossing situation* Two power-driven vessels are crossing so as to involve risk of collision → The vessel which has the other on her own starboard side → Keep out of the way → Avoid crossing ahead of the other vessel.	
16	*Action by give-way vessel* Every vessel directed to keep out of the way of another vessel → Take early and substantial action to keep well clear.	
17	*Action by stand-on vessel* (a) (i) → Shall keep her course and speed. (ii) → May however take action to avoid collision by her manoeuvre alone, as soon as it becomes apparent that the give-way vessel not taking appropriate action. (b) If the stand-on vessel finds herself so close that collision cannot be avoided by the action of the give-way vessel alone → Shall take such action as will best aid to avoid collision. (c) In a crossing situation → Not alter course to port for a vessel on her own port side. (d) This Rule does not relieve the give-way vessel of other obligation to keep out of the way.	

18	*Responsibilities between vessels* Except where Rules 9, 10 and 13 otherwise require: (a) (b) (c) A vessel not under command > A vessel restricted in her ability to manoeuvre > A vessel engaged in fishing > A sailing vessel > A power-driven vessel underway (d) (i) Any vessel (except a vessel not under command or a vessel restricted in her ability to manoeuvre) → Avoid impeding the safe passage of a vessel constrained by her draught. (ii) A vessel constrained by her draught → Navigate with particular caution. (e) A seaplane on the water → Keep well clear of all vessels and avoid impeding their navigation. (f) (i) A WIG craft → Keep well clear of all other vessels and avoid impeding their navigation. (ii) (ii) A WIG craft operating on the water surface = A power-driven vessel.	

SECTION III – CONDUCT OF VESSELS IN RESTRICTED VISIBILITY

Rule	**Summary**	**Explanation**
19	*Conduct of vessels in restricted visibility* (a) Apply to vessels not in sight of one another when navigating in or near an area of restricted visibility. (b) Every vessel → Proceed at a safe speed. A power-driven vessel → Have engines ready for immediate manoeuvre. (c) Every vessel → Have due regard to the prevailing circumstances and conditions of restricted visibility when complying with the Rules of Section 1 of this Part. (d) A vessel which detects by radar alone the presence of another vessel → Determine if a close-quarters situation is developing	

	and/or risk of collision exists. → Shall take avoiding action in ample time, avoid: (i) an alteration of course to port for a vessel forward of the beam, other than for a vessel being overtaken; (ii) an alteration of course towards a vessel abeam or abaft the beam. (e) If a risk of collision exists, every vessel which hears apparently forward of her beam the fog signal of another vessel, or which cannot avoid a close-quarters situation with another vessel forward of her beam, → Reduce her speed to the minimum at which she can be kept on her course. → Take all her way off and in any event navigate with extreme caution until danger of collision is over.	

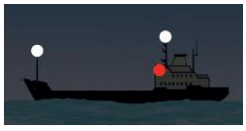
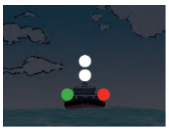
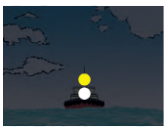
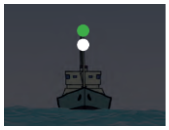
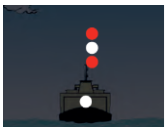
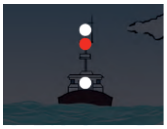
3.11.4 COLREG REGULATIONS. PARTS C AND D.

Правила МППСС–72 частей C и D

RULE 21

Rule	**Definitions**	**Explanation**
(a)	Masthead light	225° (22.5°)
(b)	Sidelights	112.5° (22.5°)
(c)	Sternlight	135° (67.5°)
(d)	Towing light (Yellow)	135° (67.5°)
(e)	All-round light	360°
(f)	Flashing light	≥ 120 flashes/min

PART C – LIGHTS AND SHAPES

Rule	Vessel	Lights				Shapes
		SB	PS	Ahead	Astern	
23	Power-driven vessels underway					
24	Towing and pushing					♦
25	Sailing vessels underway and vessels under oars					▼
26	Fishing vessels					▼ ▲
27	Vessels not under command or restricted in their ability to manoeuvre	 	 	 	 	● ● ● ♦ ●
28	Vessels constrained by their draught					■
29	Pilot vessels					
30	Anchored vessels and vessels aground		 		 	● ● ● ●
31	Seaplanes					

Annex II	Additional signals for fishing vessels fishing in close proximity					

PART D – SOUND AND LIGHT SIGNALS

Rule	Vessel	Sound
34	*Manoeuvring and warning signals*	
	(a) When vessels are in sight of one another, a power-driven vessel underway (b)	• (India – I am altering my course to starboard) • • (Echo – I am altering my course to port) • • • (Sierra – I am operating astern propulsion)
	(c) When in sight of one another in a narrow channel or fairway: (i) A vessel intending to overtake another → Indicate intention: (ii) The vessel about to be overtaken → Indicate agreement:	– – • (I intend to overtake you on your starboard side) – – • • (I intend to overtake you on your port side) – • – •
	(d) The vessel in doubt → Immediately indicate such doubt.	• • • • •
	(e) A vessel nearing a bend or an intervening obstruction	– (Answer –)
35	*Sound signals in restricted visibility*	
	(a) A power-driven vessel making way through the water	– [2 minutes]
	(b) A power-driven vessel underway but stopped and making no way through the water	– – [2 minutes]
	(c) A vessel not under command, a vessel restricted in her ability to manoeuvre, a vessel constrained by her draught, a sailing vessel, a vessel engaged in fishing and a vessel engaged in towing or pushing another vessel	– • • [2 minutes]

	(d) A vessel engaged in fishing, when at anchor, and a vessel restricted in her ability to manoeuvre when carrying out her work at anchor	
	(e) A vessel towed or if more than one vessel is towed the last vessel of the tow, if manned	– • • • [2 minutes]
	(f) A pushing vessel and a vessel being pushed ahead are rigidly connected in a composite unit = A power-driven vessel	
	(g) A vessel at anchor Vessels ≥ 100 metres A vessel at anchor may in addition → Warning of position and of the possibility of collision to an approaching vessel.	(Bell 5s) [1 minute] (Bell 5s) + (Gong 5s) [1 minute] • – •
	(h) A vessel aground	(3 strokes) (Bell 5s) (3 strokes) + (Gong 5s) [1 minute]
	(i) A vessel of 12 metres or more but less than 20 metres	
	(j) A vessel of less than 12 metres	
	(k) A pilot vessel when engaged on pilotage duty	• • • • (Hotel)
36	*Signals to attract attention*	
37 Annex IV	*Distress signals*	

3.11.5 CHECKLIST IN RESTRICTED VISIBILITY

Чек-лист при плавании в ограниченную видимость

RESTRICTED VISIBILITY

RUSSIAN RONS-89	☑
During deterioration of visibility the watch officer shall:	
Arrange fog signals sending.	☐
Change over to manual steering.	☐
Inform the master and the watch engineer, check communications with the engine room, the main engine to the manoeuvring mode.	☐
Switch on the Radar and ARPA, begin radar-tracking observation.	☐
Determine ship's position, switch on the echo sounder, if shallows occur.	☐
Instruct and post a lookout with bridge communication in service.	☐
Switch on navigating lights, check that the VHF radio-station is switched on a duty channel.	☐
Check the closure of doors in watertight bulkheads.	☐
Compare the compasses indications.	☐
Compare the bridge clock against the engine room clock.	☐
Put down a mark of time on the course recorder sheet and produce the print-out of reverse data.	☐
Under instruction of the master – call the watch off duty navigators to the bridge with a view to strengthen the watch.	☐

3.11.6 RISK ASSESSMENTS

Заполненная форма "Анализ рисков" при плавании: в портовых водах, на мелководье, при угрозе столкновения судов.

No.	Condition	Factor affected	Risk	Remark
1	**In confined waters**	Dense traffic Narrow channel Insufficient room Position fixing	Collision Pollution	
2	**In shallow waters**	Increase of draft/ Squat Echo sounding data	Grounding/ Stranding Pollution	
3	**Risk of collision**	Improper lookout Poor visibility Lack of information	Collision Pollution	

3.11.7 OOW'S DUTIES FOR PREVENTING COLLISIONS

Порядок действий ВПКМ при обнаружении цели на экране РЛС, захват, сопровождение. Оценка опасности сближения (фото или эскиз).

No.	Action	Remark
1	Keep a proper lookout by all available means	
2	Acquire targets, which may cause collision or close-quarter situations.	
3	Observer continuously the acquired targets with radar and AIS data.	
4	Take action immediately when there is any risk of collision or close-quarter situations.	
5	Continue observer the targets until pass clearly.	

3.11.8 RADAR. ARPA.

Эскиз с Руководства панели управления РЛС-САРП с описанием назначения каждой функции

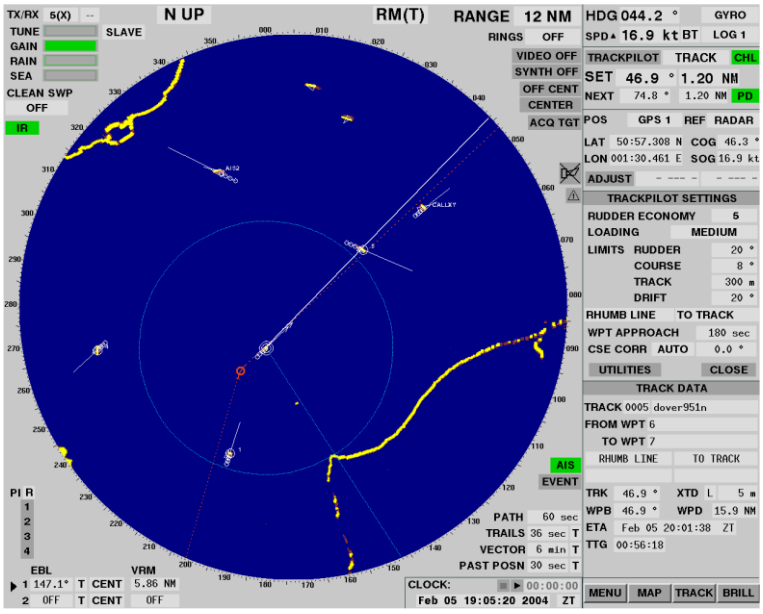
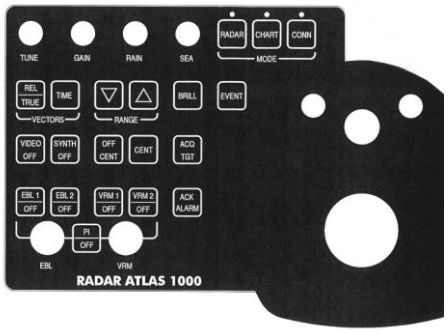


Figure 3.11.8.1. MULTIPILOT 1100 [3.11]

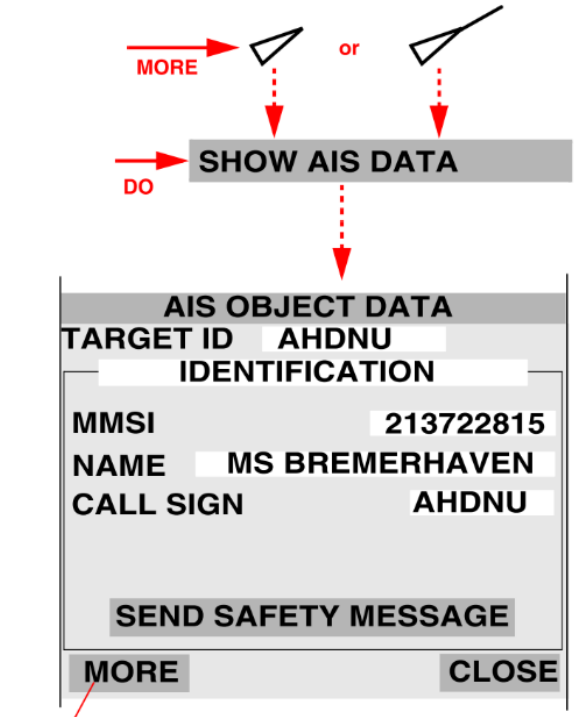
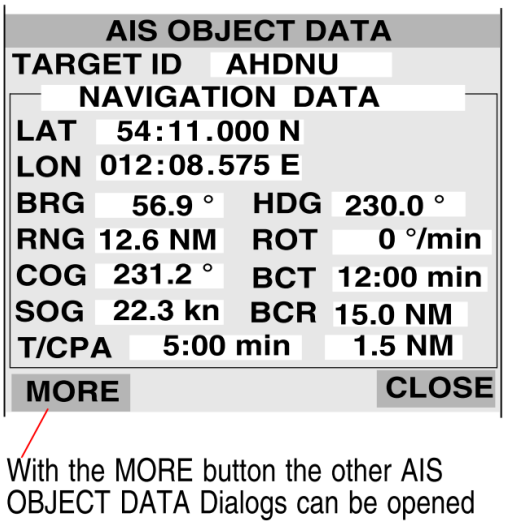
The radar keyboard	 TUNE / GAIN / RAIN / SEA – Setting the radar video MODE (RADAR / CHART / CONN) – Switching over the display modes, Activating a non-active keyboard VECTORS (REL | TRUE / TIME) – Setting the vectors of targets and own ship RANGE (▽ / △) – Range/scale selection BRILL – Setting of brilliance, colour, keyboard illumination EVENT – Printing out the screen content, Setting and deleting event markers, Setting and deleting position fixes VIDEO OFF / SYNTH OFF – Suppression of the video or synthetics CENT / OFF CENT – Centering/off-centering the display ACQ TGT – Manual target acquisition EBL 1 | OFF / EBL 2 | OFF / EBL – Operating electronic bearing lines VRM 1 | OFF / VRM 2 | OFF / VRM – Operating variable range markers PI | OFF – Operating parallel indexes ACK ALARM – Acknowledging an alarm

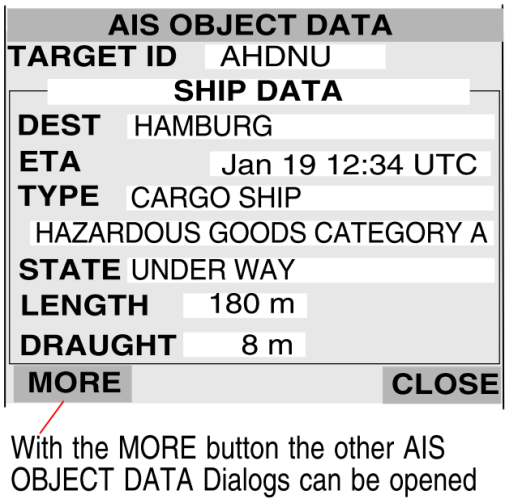
Reference: 7.3 Radar

3.11.9 ECDIS. AIS AND RADAR INFORMATION.

Информация, отображаемая от АИС и РЛС на экране ECDIS (фото) и пояснения

AIS TARGET DATA

Data	Description
IDENTIFICATION	
NAVIGATION DATA	

SHIP DATA	

RADAR TARGET DATA

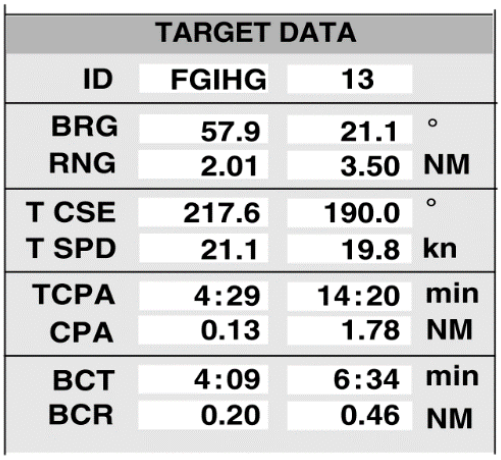


Figure 3.11.9.1. Target Data Display [3.11]

No.	Data	Description
1	ID (Identifier)	The target ID
2	BRG (Bearing)	The bearing of the target
3	RNG (Range)	The range of the target
4	CSE (Course)	With prefix T (True): course over ground / through the water With prefix R (Relative): course relative to your own ship
5	SPD (Speed)	With prefix T (True): speed over ground / through the water With prefix R (Relative): speed relative to your own ship
6	TCPA (Time to CPA)	The time up until the closest point of approach

7	CPA (Closest point of approach)	The distance at the closest point of approach
8	BCT (Bow crossing time)	The time that will pass before the target crosses the heading line of your own ship
9	BCR (Bow crossing range)	The range of the point on own ship's heading line at which the target will cross that line. Negative value: Target crosses the stern line behind own ship.

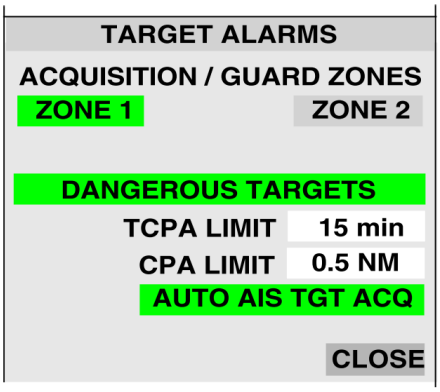
3.11.10 WARNINGS/ ALARMS

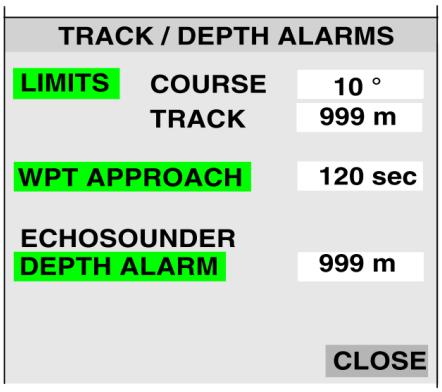
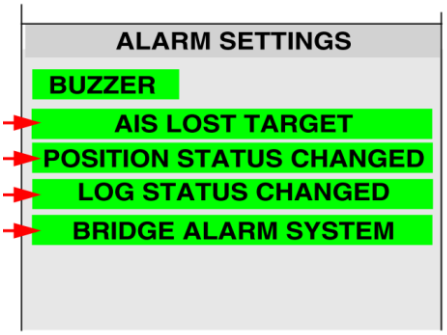
Виды оповещений для ВПКМ с приборов ECDIS и РЛС-САРП

DANGEROUS TARGET

Dangerous target	**ARPA symbol**	**AIS symbol**
Target which has triggered the DANGEROUS TARGET (n) alarm	*(Flashing red)*	*(Flashing red)*

ALARMS SETTINGS

Alarm settings	**Description**
Target Alarm Settings	

Track / Depth Alarms	
Suppressing Certain Alarms	

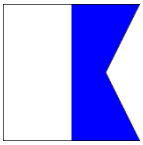
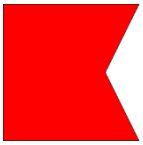
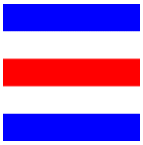
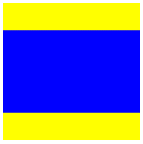
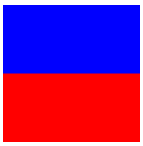
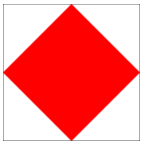
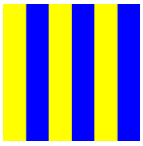
Reference: 7.5 AIS

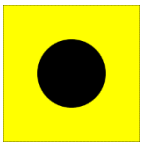
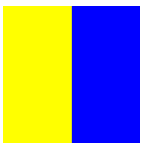
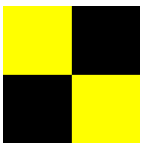
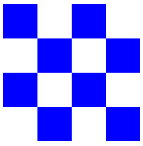
3.12 SIGNALING AND COMMUNICATION

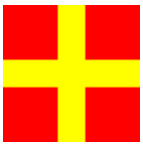
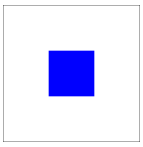
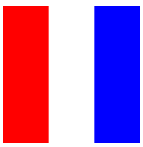
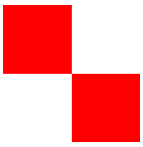
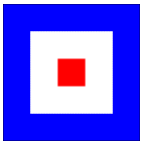
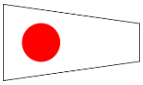
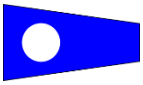
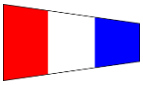
Сигнализация и связь

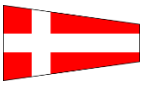
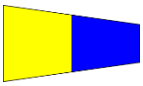
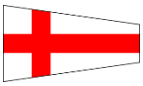
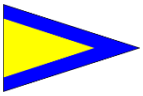
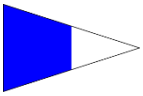
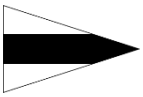
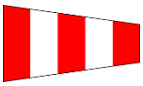
3.12.1 ICS. MORSE CODE.

МСС-65. Значение однобуквенных сигналов. Двух- или трехфлажный сигнал. Знание процедурных слов и фраз (DE, CQ, YZ, Interco и т. п.). Световые сигналы азбуки Морзе. Сигнал бедствия SOS в соответствии с дополнением IV МППСС и приложения 1 МСС. Визуальные сигналы в виде одной буквы или группы букв.

No.	Signal	Flag	Morse code	Meaning
1	A – Alfa		• –	I have a diver down; keep well clear at slow speed. | У меня спущен водолаз; держитесь в стороне от меня и следуйте малым ходом.
2	B – Bravo		– • • •	I am taking in or discharging or carrying dangerous goods. | Я гружу, или выгружаю, или имею на борту опасный груз.
3	C – Charlie		– • – •	Affirmative. | Утвердительный ДА или «Значение предыдущей группы должно читаться в утвердительной форме».
4	D – Delta		– • •	Keep clear of me; I am maneuvering with difficulty. | Держитесь в стороне от меня; я управляюсь с трудом.
5	E – Echo		•	I am altering my course to starboard. | Я изменяю свой курс вправо.
6	F – Foxtrot		• • – •	I am disabled; communicate with me. | Я не управляюсь; держите связь со мной.
7	G – Golf		– – •	I require a pilot. “I am hauling nets.” | Мне нужен лоцман. «Я выбираю сети».

8	H – Hotel		• • • •	I have a pilot on board. | У меня есть на борту лоцман.
9	I – India		• •	I am altering my course to port. | Я изменяю свой курс влево.
10	J – Juliet		• – – –	I am on fire and have dangerous cargo on board: keep well clear of me. “I am leaking dangerous cargo.” | У меня пожар и я имею на борту опасный груз; держитесь в стороне от меня.
11	K – Kilo		– • –	I wish to communicate with you. | Я хочу установить связь с вами.
12	L – Lima		• – • •	In harbour: “The ship is quarantined.” At sea: “You should stop your vessel instantly.” | Остановите немедленно своё судно.
13	M – Mike		– –	My vessel is stopped and making no way through the water. | Мое судно остановлено и не имеет хода относительно воды.
14	N – November		– •	Negative. | Отрицательный НЕТ или «Значение предыдущей группы должно читаться в отрицательной форме».
15	O – Oscar		– – –	Man overboard. | Человек за бортом.
16	P – Papa		• – – •	The Blue Peter. In harbour: “All persons should report on board as the vessel is about to proceed to sea.” At sea: It may be used by fishing vessels to mean: “My nets have come fast upon an obstruction.” | Всем следует быть на борту, так как судно скоро снимается. «Мои сети зацепились за препятствие».
17	Q – Quebec		– – • –	My vessel is ‘healthy’ and I request free pratique. | Мое судно незараженное, прошу предоставить мне свободную практику.

18	R – Romeo		• – •	(No ICS meaning as a single flag) | Самостоятельного значения не имеет.
19	S – Sierra		• • •	I am operating astern propulsion. | Мои движители работают на задний ход.
20	T – Tango		–	Keep clear of me; I am engaged in pair trawling. | Держитесь в стороне от меня; я произвожу парное траление.
21	U – Uniform		• • –	You are running into danger. | Вы идете к опасности.
22	V – Victor		• • • –	I require assistance. | Мне необходима помощь.
23	W – Whiskey		• – –	I require medical assistance. | Мне необходима медицинская помощь.
24	X – X-ray		– • • –	Stop carrying out your intentions and watch for my signals. | Приостановите выполнение ваших намерений и наблюдайте за моими сигналами.
25	Y – Yankee		– • – –	I am dragging my anchor. | Меня дрейфует на якоре.
26	Z – Zulu		– – • •	I require a tug. “I am shooting nets.” | Мне нужен буксир. «Я выметываю сети».
27	0 – Nadazero		– – – – –	
28	1 – Unaone		• – – – –	
29	2 – Bissotwo		• • – – –	
30	3 – Terrathree		• • • – –	

31	4 – Kartefour		• • • • –	
32	5 – Pantafive		• • • • •	
33	6 – Soxisix		– • • • •	
34	7 – Setteseven		– – • • •	
35	8 – Oktoeight		– – – • •	
36	9 – Novenine		– – – – •	
37	1st Substitute			Repeat one Первый заменяющий
38	2nd Substitute			Repeat two Второй заменяющий
39	3rd Substitute			Repeat three Третий заменяющий
40	Code/Answer Pennant			Ответный вымпел
41	DE		– • • •	“From...” – used to precede the name or identity signal of the calling station.
42	CQ		– • – • – – • –	Call for unknown station(s) or general call to all stations.
43	YZ		– • – – – – • •	The words which follow are in plain language.
44	Interco			International Code group(s) follow(s)
45	SOS		• • • – – – • • •	Distress signals

3.12.2 EPIRB

АРБ системы КОСПАС-SARSAT. Принцип действия. Порядок включения АРБ, тестирование.

SATELLITE EMERGENCY POSITION INDICATING RADIO BEACON COSPAS-SARSAT

Figure 3.12.2.1. EPIRB [3.12]

COSPAS-SARSAT

A global distress warning system operating on an exclusive frequency (406.205 MHz) used to determine the vessel position, transmit its identification and alert the Search and Rescue Services (SAR).

EPIRBs	Satellite emergency position indicating radio beacons
⬇	
Transmission	406 MHz – UHF band – COSPAS-SARSAT satellites 121.5 MHz – VHF band – Aeronautical distress frequency (Homing procedure)
⬇	
Satellite sector	Satellites on polar orbits
⬇	
LUTs	Local User Terminals
⬇	
MRCCs	Mission and Rescue Control Centers

ACTIVATION PROCEDURE

Emergency instructions	1. Remove EPIRB from float-free container 2. Secure EPIRB with tether line and throw in water
Manual activation	3. Remove EPIRB from its bracket 4. Unfold antenna 5. Unscrew plastic cap 6. Switch to ON 7. Check red light and flash work 8. Screw plastic cap back on 9. Install beacon in open area or secure EPIRB with tether line and throw in water 10. To stop EPIRB, remove from water and switch back to READY

TEST PROCEDURE

Every 6 months ***By the end-user***	1. Press TEST button. 2. After 5 seconds, the self-test starts to check battery voltage and 406 MHz transmission power. ▪ If red flashing light flashes regularly every ½ second, the beacon operates correctly. ▪ If red flashing light flashes in an irregular fashion, one of the two parameters controlled may be weak (battery voltage or 406 MHz transmission power). *In this case:* Repeat 3 times to confirm defect before contacting agent. A negative test does not necessarily mean that the EPIRB is defective. 3. The self-test stops automatically and does not exceed 40 seconds.
Every year	*By Navigation Inspector, the security officer on board or a representative of the manufacturer*
Every 2 years ***By a recommended agent***	Check the beacon completely Change the seals Check the water-tightness Change the hydrostatic release system
Every 4 years ***By recommended agent only with original parts***	The battery pack must be replaced The beacon operation checked thoroughly The operation described in the 2-year test will also be performed If the beacon is used for other than EPIRB testing, the batteries must be changed irrespective of duration of transmission.

3.12.3 SART

Радиолокационный маяк-ответчик (SART). Назначение, принцип действия, процедура проверки.

SEARCH AND RESCUE RADAR TRANSPONDER

Figure 3.12.3.1. SART [3.12]

OPERATING PRINCIPLE

SART is a very simple 9 GHz receiver/ transmitter which provides a position.
The fundamental function of the SART is to indicate its position by producing range and bearing information on any 9 GHz radar screen (with no modification).
The SART code displayed on the radar screen is a series of dots extending radially outwards from the location of the transponder.
The series of dots represents a range of approximately 10 nautical miles. This indication is an internationally accepted signal for search and rescue operations.
In addition, the SART gives confidence to survivors by giving a loud signal and visual indication of the approach of assistance.

SARTs	Search and rescue radar transponders
⬇	
Transmitter/ Receiver	9 GHz
⬇	
Radar	Rescuers/ Vessels in the vicinity

OPERATION PROCEDURE

On-board operation ***In an emergency where the ship is not abandoned***	1. Remove the SART from its bracket 2. Activate the SART by pulling the pin out 3. Check that the red light is on 4. Place it in an open area
Over-board operation ***In an emergency where the ship is abandoned***	1. Remove the SART from its bracket 2. Activate the SART by pulling the pin out 3. Check that the red light is on 4. Keep the lanyard fully extended to prevent interference from bodily transmission
Life-raft operation	1. Remove the SART from its bracket 2. Activate the SART by pulling the pin out 3. Check that the red light is on 4. Install the SART according to the kit supplied either: ▪ Screw it on rubber mounting ▪ Attach with Velcro band inside canopy ▪ Install pole inside life-raft and screw it on top

TEST PROCEDURE

Every 6 months ***By the end-user***	Remove the SART from its bracket Check for any visible sign of damage Turn the black ring to TEST position and hold for a few seconds Flashing light and beeper indicate good working order Release the black ring (this turns the SART off) Note: The auto-test stops after 10 seconds Check next inspection date Replace in bracket Warning: While the SART is activated, it will respond to any 9 GHz radar within range. The test must be as brief as possible to avoid interference and to save battery life.
Test on radar	Maintain the SART in position TEST. After 10 seconds, the flashing light and beeper stop and the SART switches automatically to stand-by to respond to any radar within a distance of ≥ 500 meters. When this test is over, release the black ring to turn the SART off.

	Warning: Ensure that this is allowed by Local Authorities before proceeding with this test.
Test with 2 "Rescuer" SARTs	If there are 2 SARTs on board, a recommended test is as follows: Maintain SART No. 1 in position TEST and wait 10 seconds for SART to switch to stand-by. Put SART No. 2 in position TEST SART No. 1 will reply to SART No. 2 Reverse operation to test SART No. 2 Light and beeper indicate good working order When this test is over, release the black ring to turn the SART off
Every 4 years ***By approved agent only***	The battery pack must be replaced, and the transponder operation checked thoroughly. If the transponder is used for any reason other than test, the batteries must be changed irrespective of duration of transmission.

3.12.4 HANDHELD VHF RADIOS

Назначение и требования, предъявляемые к УКВ переносной радиостанции

SAILOR PORTABLE VHF GMDSS TRANSCEIVER

Figure 3.12.4.1. SAILOR VHF GMDSS [3.12]

Introduction	The new SAILOR portable VHF transceiver is approved to fulfil the GMDSS requirements for portable VHF radios for Safety at Sea and is waterproof to the IP67 standard.
Precaution	Avoid water and salt in the I/O connector and keep it clean frequently. Only use original Thrane & Thrane battery packs. Make sure they are clean and dry before attaching the transceiver. Be careful not to damage any gaskets. Only use the original Thrane & Thrane charger for the rechargeable battery. Be very careful when handling the Lithium batteries. With correct use they are safe, but any misuse might cause dangerous situations. Never short circuit the battery terminals, never expose the transceiver and the batteries to extreme temperature or fire and never use any kind of violence. Avoid close contact between the antenna and parts of the human body. The top of the antenna must never be closer than 5 cm to the body when transmitting. Do not submerge the transceiver more than 1 m for 30 minutes. Keep the transceiver at least 0.3 m away from the magnetic compass.
Performance	For best performance of the transceiver keep the following in mind: ▪ Keep clear of metal environment. ▪ Hold the transceiver vertically and 10 cm from lips and push the PTT when transmitting. ▪ In receive mode carry the transceiver vertically with belt clips. ▪ To preserve battery power, adjust squelch to close the loudspeaker when there is no signal. ▪ If in a lifeboat, keep the antenna as high as possible.
Channel	This radio operates with the following channels: 06 – 08 – 09 10 – 11 – 12 – 13 – 14 – 15 – 16 – 17 67 – 68 – 69 71 – 72 – 73 – 74 – 75 – 76 – 77 87 – 88 Notes: All channels are Simplex Tx power is limited to 1 W on Channels 75 and 76
Batteries	The primary battery The yellow primary battery pack is only for emergency use and is not rechargeable. The primary non-rechargeable battery pack is capable of providing sufficient power for the specified 8 hours according to regulations. The secondary battery The black secondary battery pack contains a rechargeable battery. This battery pack is for daily use.

	The battery will normally last for 5 to 9 hours of use on a fully charged battery.
Emergency procedure	Remove the top-seal of the yellow emergency battery package. Insert the battery package into the handheld transceiver. Turn the knob at the top of the radio clockwise. The display lights up showing the last used channel and the battery level. Select Channel 16 (Distress or Safety), press the 16/C key. Press the PTT and say "MAYDAY PROCEDURE": MAYDAY – MAYDAY – MAYDAY This is NAME of the VESSEL in distress (3x) CALLSIGN (or other IDENTIFICATION) MMSI (if the initial alert is sent by DSC) MAYDAY NAME of the VESSEL in distress CALLSIGN (or other IDENTIFICATION) MMSI (if the initial alert is sent by DSC) POSITION LATITUDE $00°\ 00.0'N/S$ LONGITUDE $000°\ 00.0'E/W$ (or other reference to a known geographical location) NATURE of distress Kind of ASSISTANCE required Any other useful INFORMATION OVER. Release PTT and listen for answer.

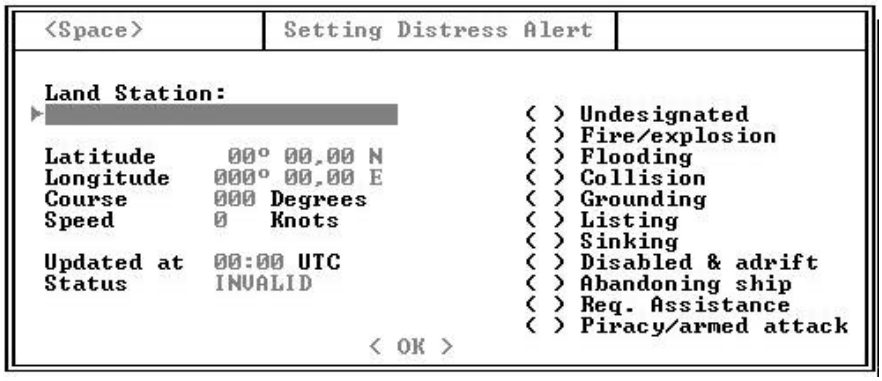
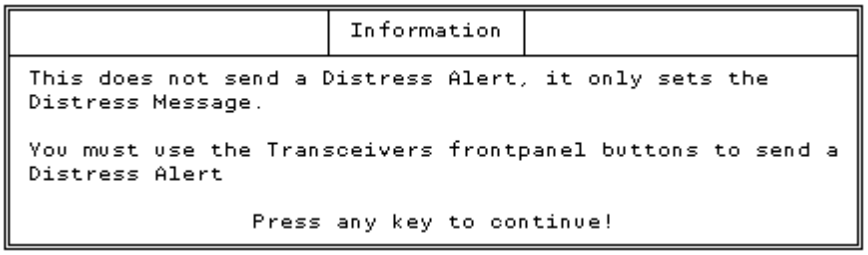
3.12.5 GMDSS

Способы подачи сигнала бедствия при помощи аппаратуры ГМССБ. Действия ВПКМ при подаче аппаратурой ложного сигнала бедствия.

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM

GMDSS EQUIPMENT

No.	GMDSS equipment	Distress signal
1	VHF with DSC SAILOR VHF DSC Duplex	QUICK DSC DISTRESS CALL (Only for emergency use) 1. If necessary, switch on by pressing the [ON/OFF] button 2. Lift up the lid covering the orange [Distress] key and press for 5 seconds. 3. The Alarm indicator light will flash and will be accompanied by a sound. Distress message is sent at the continuous tone. 4. Unless stopped manually, by pressing the [Menu] key or switching the unit off, the distress call is automatically repeated every 3½ – 4½ minutes until distress acknowledgment is received. 5. Wait for distress acknowledgement and start mayday procedure. If an alarm panel is connected the VHF DISTRESS button on this unit will have the same functionality. 6. All further handling should continue in front of the main VHF DSC. MAYDAY PROCEDURE When DSC distress acknowledgement is received after pressing [Distress], or if otherwise need to commence distress traffic via radiotelephony on the distress traffic frequency Channel 16, follow this procedure: MAYDAY – MAYDAY – MAYDAY This is NAME of the VESSEL in distress (3x) CALLSIGN (or other IDENTIFICATION) MMSI (if the initial alert is sent by DSC) MAYDAY NAME of the VESSEL in distress CALLSIGN (or other IDENTIFICATION) MMSI (if the initial alert is sent by DSC)

		POSITION LATITUDE 00° 00.0′N/S LONGITUDE 000° 00.0′E/W (or other reference to a known geographical location) NATURE of distress Kind of ASSISTANCE required Any other useful INFORMATION OVER.
2	Inmarsat-C with EGC receiver	Maritime Distress Set the Distress Message via the Distress Menu  Land Station: Will normally be filled in with the station used for the latest transmission. Edit the field by pressing Spacebar. Position Field: The current position. Nature of Distress: Shows here the types available for Maritime Distress. The Maritime Distress Alert parameters set-up in the Distress Menu are transferred to the transceiver. The parameters are valid in the transceiver for an hour or until a distress acknowledgement is received. A Maritime Distress Alert is not sent from the Distress Menu. A warning about this when leaving the Distress Menu:  To actually send a Maritime Distress Alert, press the Stop and Alarm buttons on the transceiver simultaneously for at least 5 seconds until the Alarm indicator starts flashing. After sending a Maritime Distress Alert, then send a Detailed Distress Message.

		Sending a detailed Distress Message 1. Type in the message in the Text Field of the Editor. 2. Choose Transmit (Alt + T). 3. Press the Tabulation Key to move the highlight one position to the right to the priority field '(•) Routine' . Note. The Address Book may pop up when doing this, if the address field is empty. Just select the first destination as the address won't be used. 4. Press Arrow Down twice to move to '( ) Distress' and press Spacebar to select. This causes the address field to show 'SEARCH & RESCUE'. 5. Press Enter to move the highlight to '<SEND>' and press Enter again to transmit. Note. If the Land Station field is empty, the highlight will be positioned there instead. Press Spacebar to get the Land Station list and select a station. Press Enter to move to '<SEND>'. 6. Confirm the distress priority transmission by pressing Enter. Note. This applies only to Maritime Units.
3	MF/HF telephony with DSC and NBDP SAILOR SYSTEM 5000 MF/HF DSC	QUICK DSC DISTRESS CALL (Only for emergency use) 1. If necessary, switch on by pressing the [ON/OFF] button 2. Lift up the lid covering the orange [Distress] key and press for 5 seconds. 3. The distress will be accompanied by a sound. Distress message is sent at the continuous tone. 4. Unless stopped manually, by pressing the [Cancel] softkey or switching the unit off, the distress call is automatically repeated every 3½ – 4½ minutes until distress acknowledgment is received. 5. Wait for distress acknowledgement and start mayday procedure. If an alarm panel is connected the MF/HF DISTRESS button on this unit will have the same functionality. 6. All further handling should continue in front of the main MF/HF DSC. MAYDAY PROCEDURE Reference: 1 Transmission of DSC distress alert on MF/HF (2, 4, 6, 8, 12, 16 MHz) 2187.5 kHz, 4207.5 kHz, 6312.0 kHz, 8414.5 kHz, 12577.0 kHz, 16804.5 kHz
4	Handheld GMDSS VHF transceiver	Reference: 3.12.4

	SAILOR PORTABLE VHF GMDSS TRANSCEIVER	
5	EPIRB	*Reference: 3.12.1*
6	SART	*Reference: 3.12.2*
7	NAVTEX receiver 518 kHz	N/A

FALSE ALERT CANCELLATION PROCEDURES

No.	**GMDSS equipment**	**False alert cancellation**
1	VHF with DSC	→ False alert detected during transmission → Reset transmitter immediately → Set equipment to VHF Channel 16 → Make broadcast to "All stations" All stations (3x) This is NAME, CALLSIGN, MMSI NUMBER, POSITION Cancel my Distress Alert of DATE, TIME, UTC Master, NAME, CALLSIGN, MMSI NUMBER DATE, TIME, UTC
2	Inmarsat-C with EGC receiver	Notify the appropriate RCC to cancel the alert by sending a distress priority message via the same LES through which the false distress alert was sent. NAME, CALLSIGN, INMARSAT-C IDENTITY NUMBER (INM), POSITION Cancel my Distress Alert of DATE, TIME, UTC Master, NAME, CALLSIGN, INMARSAT-C IDENTITY NUMBER (INM), DATE, TIME, UTC
3	MF telephony with DSC and NBDP	→ False alert detected during transmission → Reset transmitter immediately

		→ Tune equipment to 2182 kHz Rx/Tx → Make broadcast to "All stations" All stations (3x) This is NAME, CALLSIGN, MMSI NUMBER, POSITION Cancel my Distress Alert of DATE, TIME, UTC Master, NAME, CALLSIGN, MMSI NUMBER DATE, TIME, UTC
4	HF telephony with DSC and NBDP	→ False alert detected during transmission → Reset transmitter immediately → Tune equipment consecutively to all the radio telephony distress frequencies on which the false alert was transmitted as necessary (4, 6, 8, 12, 16 MHz) → Make broadcast to "All stations" All stations (3x) This is NAME, CALLSIGN, MMSI NUMBER, POSITION Cancel my Distress Alert of DATE, TIME, UTC Master, NAME, CALLSIGN, MMSI NUMBER DATE, TIME, UTC
5	EPIRB	If, for any reason, an EPIRB is activated accidentally, switch off immediately. Contact the nearest coast station or appropriate LES or RCC and cancel the Distress Alert.

4 METEOROLOGY

МЕТЕОРОЛОГИЯ

CHAPTER'S CONTENT

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4.1 METEOROLOGY RECORD BOOK

Судовые гидрометеонаблюдения. Ведение журнала метеонаблюдений.

Statement of Fact:

There is an absence of an individual/ separate record book for meteorology and weather observations.

In the reality on board, the meteorology and weather observations are recorded to the "Bridge logbook" during every watch when vessel is underway, as well as to the "Deck logbook" during port stays.

There are some other record forms on board, e.g. "Weather report", "Precipitation log".

BRIDGE LOGBOOK

Direction of the wind and wind-force, weather, sea, barometer and temperature		***Pump-, tank- and bilges soundings***	***Entries for azimuth bearing, navigational and other events***
Wind			
Weather			
Sea			
Swell			
Height of the barometer			
Temperature (air)			
Temperature (sea water)			

4.2 FACSIMILE/ SYNOPTIC WEATHER CHARTS

Чтение отечественных и зарубежных факсимильных карт погоды. Определение основных синоптических образований (циклоны, антициклоны, атмосферные фронты) по синоптическим картам.

FACSIMILE/ SYNOPTIC WEATHER CHARTS

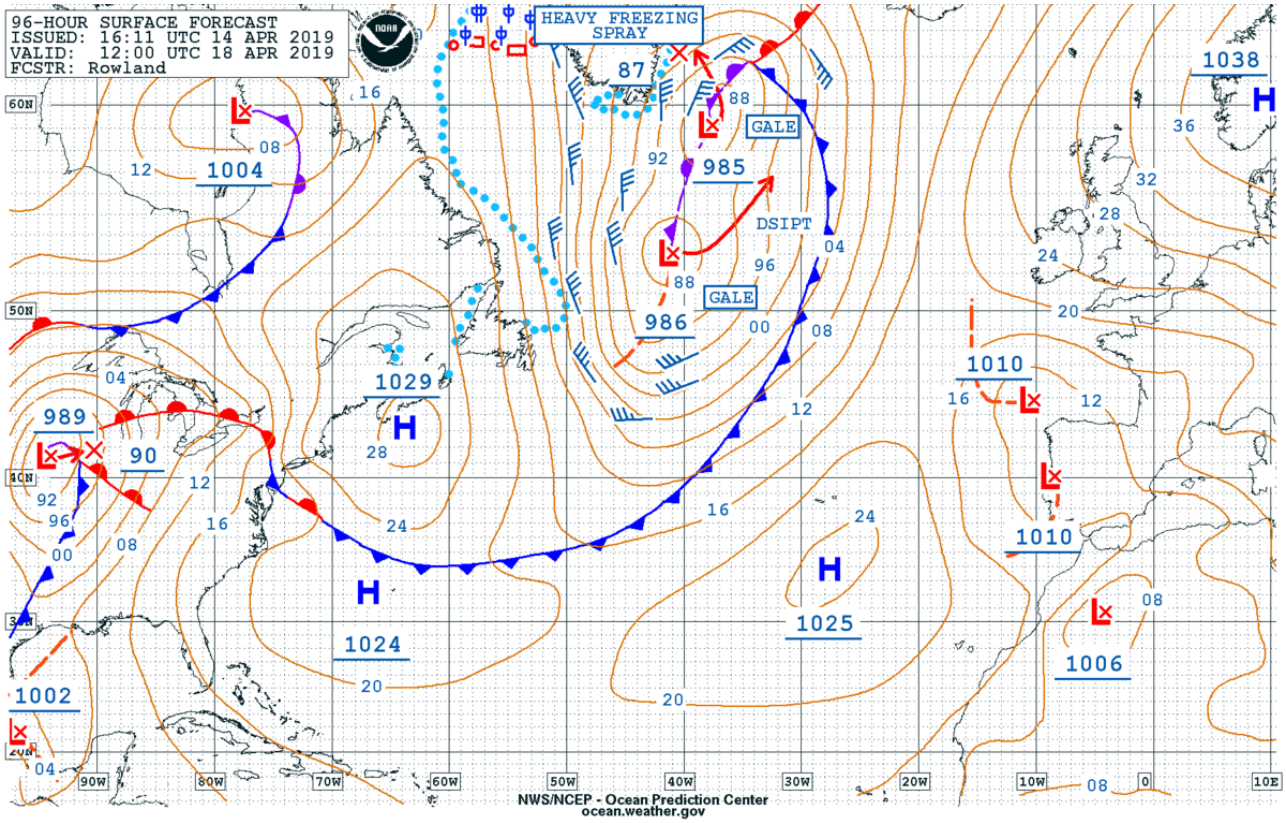


Figure 4.2.1. Surface chart – NW Atlantic [4.2]

STANDARD TEXT ABBREVIATIONS

No.	Abbreviation	Meaning	No.	Abbreviation	Meaning
1	DCRSG	Decreasing	10	MB	Millibars
2	DSIPT	Dissipate	11	MOVG	Moving
3	DSIPTG	Dissipating	12	PRES	Pressure

4	DVLPG	Developing	13	Q-STNRY	Quasi-Stationary or Near Stationary
5	FRZG SPRY	Freezing Spray	14	RPDLY INTSFYG	Rapidly Intensifying
6	G	Gusts	15	STNRY	Stationary
7	HURCN	Hurricane	16	TROF	Trough
8	INCRSG	Increasing	17	TRPCL STORM (TS)	Tropical Storm
9	KT	Knots	18	WKNG	Weakening

METEOROLOGICAL ELEMENTS

No.	Terminology	Definition
1	Cold Front	The leading edge of a relatively colder air mass which separates two air masses in which the gradients of temperature and moisture are maximized. In the northern hemisphere winds ahead of the front will be southwest and shift into the northwest with frontal passage.
2	Occluded Front	The union of two fronts, formed as a cold front overtakes a warm front or quasi-stationary front refers to a cold front occlusion. When a warm front overtakes a cold front or quasi-stationary front the process is termed a warm front occlusion. These processes lead to the dissipation of the front in which there is no gradient in temperature and moisture.
3	Stationary Front	A front that has not moved appreciably from its previous analyzed position.
4	Warm Front	The leading edge of a relatively warmer surface air mass which separates two distinctly different air masses. The gradients of temperature and moisture are maximized in the frontal zone. Ahead of a typical warm front in the northern hemisphere, winds are from the southeast and behind the front winds will shift to the southwest.
5	Low Pressure **L**	An area of low pressure identified with counterclockwise circulation in the northern hemisphere and clockwise in the southern hemisphere. Also, defined as a cyclone.
6	High Pressure **H**	An area of higher pressure identified with a clockwise circulation in the northern hemisphere and a counterclockwise circulation in the southern hemisphere. Also, defined as an anticyclone.

7	Rapidly intensifying	Indicates an expected rapid intensification of a cyclone with surface pressure expected to fall by at least 24 millibars (mb) within 24 hours.
8	Hurricane	A tropical cyclone with closed contours, a strong and very pronounced circulation, and one-minute maximum sustained surface winds 64 knots (74 mph) or greater. A system is called a hurricane over the North Atlantic, Gulf of Mexico, North Pacific E of the dateline, and the South Pacific E of 160 E.
9	Tropical Cyclone	A non-frontal, warm-core, low pressure system of synoptic scale, developing over tropical or subtropical waters with definite organized convection (thunderstorms) and a well-defined surface wind circulation.
10	Tropical Depression	A tropical cyclone with one or more closed isobars and a one-minute max sustained surface wind of less than 34 knots (39 mph).
11	Tropical Storm	A tropical cyclone with closed isobars and a one-minute max sustained surface wind of 34 knots (39 mph) to 63 knots (73 mph).
12	Typhoon	Same as a hurricane with exception of geographical area. A tropical cyclone with closed contours, a strong and very pronounced circulation, and one-minute maximum sustained surface winds of 64 knots (74 mph) or greater. A system is defined as a typhoon over the North Pacific W of the dateline.

4.3 NAVTEX

NAVTEX. Краткое описание работы. Включение, выбор станций, настройка.

NAVTEX SERVICE

NAVTEX (Navigational Telex) is an international automated medium frequency direct-printing service for delivery of navigational and meteorological warnings and forecasts, as well as urgent maritime safety information to ships.

NAVTEX was developed to provide a low-cost, simple, and automated means of receiving this information aboard ships at sea within approximately 370 km (200 nautical miles) off shore.

Where the messages contain weather forecasts, an abbreviated format very similar to the shipping forecast is used.

NAVTEX is a component of the International Maritime Organization/International Hydrographic Organization **World-wide Navigation Warning Service (WWNWS)**.

NAVTEX is also a major element of the **Global Maritime Distress and Safety System (GMDSS)**.

International Convention for the Safety of Life at Sea (SOLAS) mandated certain classes of vessels must carry NAVTEX, beginning August 1, 1993.

NAVTEX MESSAGE FORMAT

[phasing signals ≥ 10 seconds]	a phasing signal of at least ten seconds
ZCZC $B_1B_2B_3B_4$	the four characters “ZCZC” that identify the end of phasing a single space four characters B_1, B_2, B_3 and B_4 a carriage return and a line feed
[message text ...]	the information
NNNN	the four characters “NNNN” to identify the end of information a carriage return and two line feeds
[end of message phasing signals for ≥ 2 seconds before next message]	either 5 or more seconds of phasing signal and another message starting with “ZCZC” or an end of emission idle signal α for at least 2 seconds

Transmitter identity (B_1)

This character defines the transmitter identity and its associated coverage area.

Subject indicator character (B_2)

The subject indicator character is used by the receiver to identify different classes of messages below.

A	Navigational warnings
B	Meteorological warnings
C	Ice reports
D	Search & rescue information, and pirate warnings
E	Meteorological forecasts
F	Pilot service messages
G	AIS messages (formerly Decca messages)
H	LORAN messages
I	Not used (formerly OMEGA messages)
J	SATNAV messages (i.e. GPS or GLONASS)
K	Other electronic Navaid messages
L	Navigational warnings – additional to letter A (Should not be rejected by the receiver)
T	Test transmissions (UK only – not official)
V	Notice to fishermen (U.S. only – currently not used)
W	Environmental (U.S. only – currently not used)
X	Special services – allocation by IMO Navtex Panel
Y	Special services – allocation by IMO Navtex Panel
Z	No message on hand

Serial number of message (B_3, B_4)

These two characters define the serial number of each B_2 message type (class). Generally serial numbers start with the numbers ‘01’, however in special circumstances, the numbers begin with ‘00’. This forces the receiver to print the message.

Time of origin

Time of origin is in the format of “DDHHmm UTC MMM” where DD is the date, HH – hour, mm – minute and MMM – three-character abbreviation of month.
The time of the transmission of the message is in UTC.

NAVAREAs

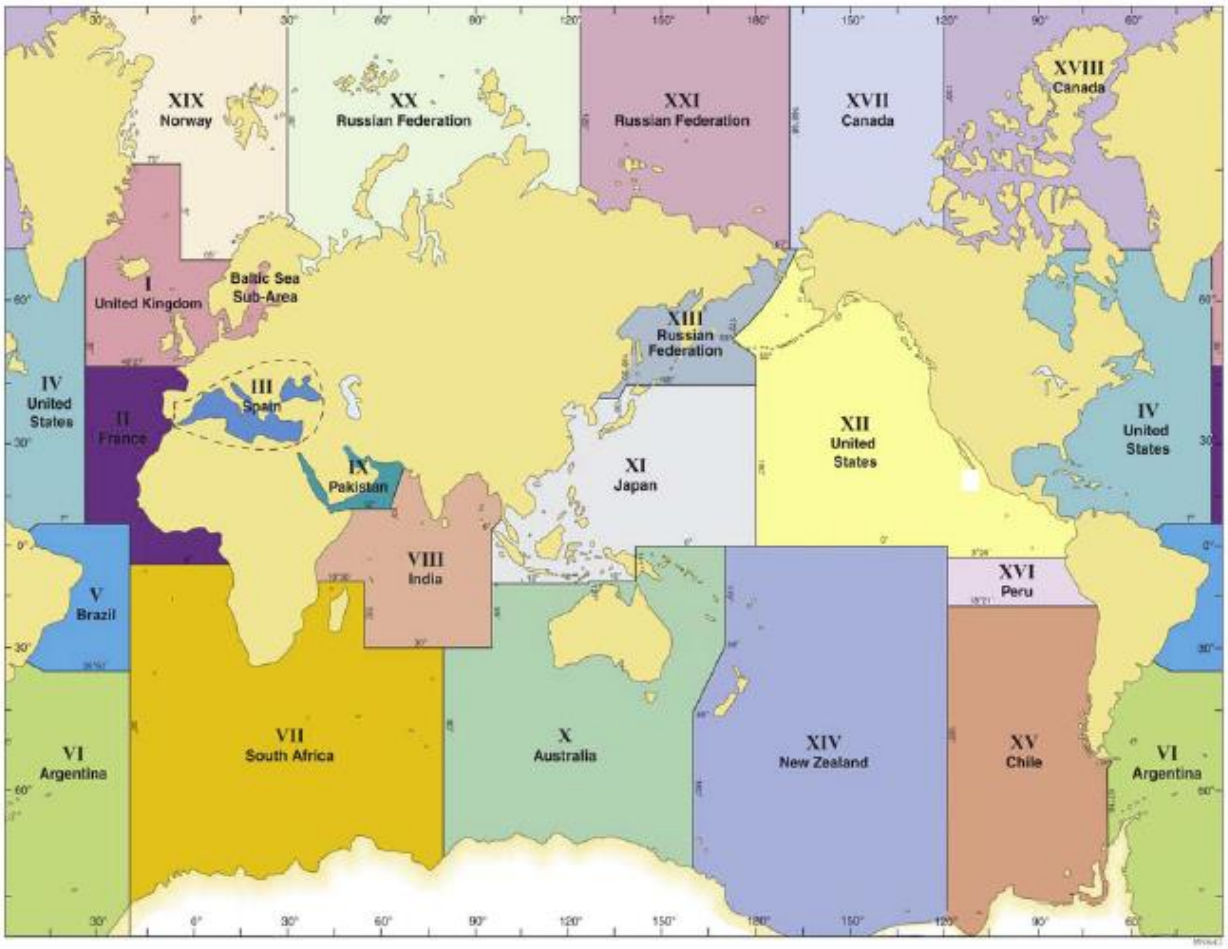


Figure 4.3.1. Map of NAVAREAs [4.3]

4.4 FACSIMILE RECEIVERS

Факсимильная аппаратура, включение, выбор станций, настройка.

Statement of Fact:

The facsimile receiver is not used on board.

There is an alternative program, which is SPOS, is currently used on a daily basis.

RADIO–FACSIMILE RECEIVER

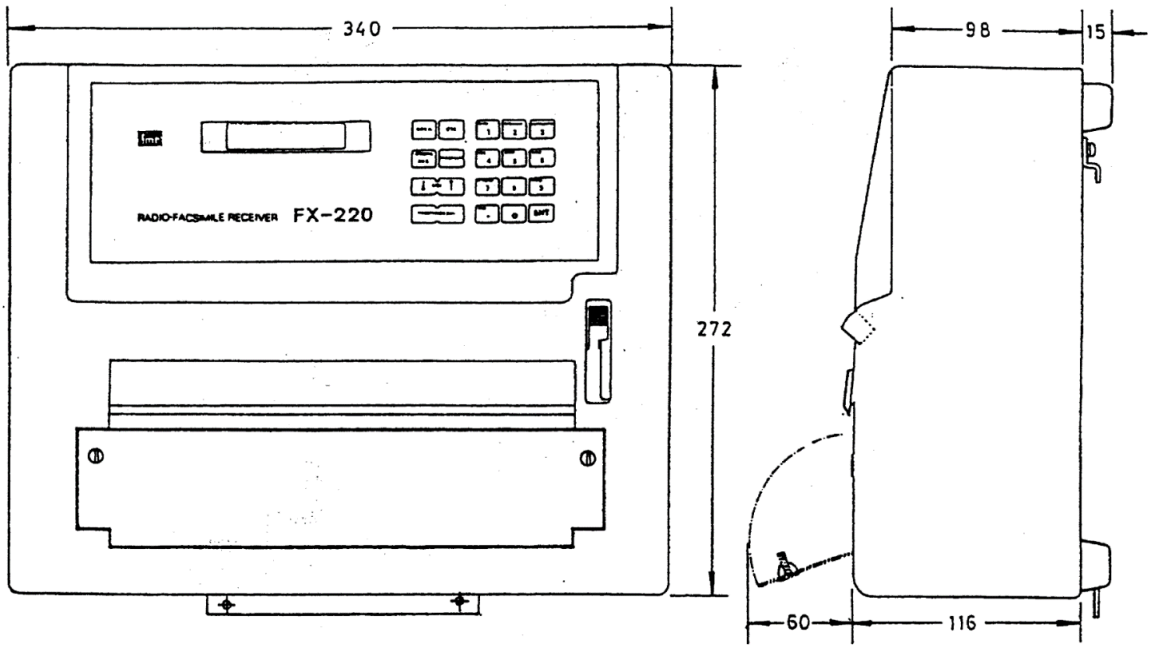
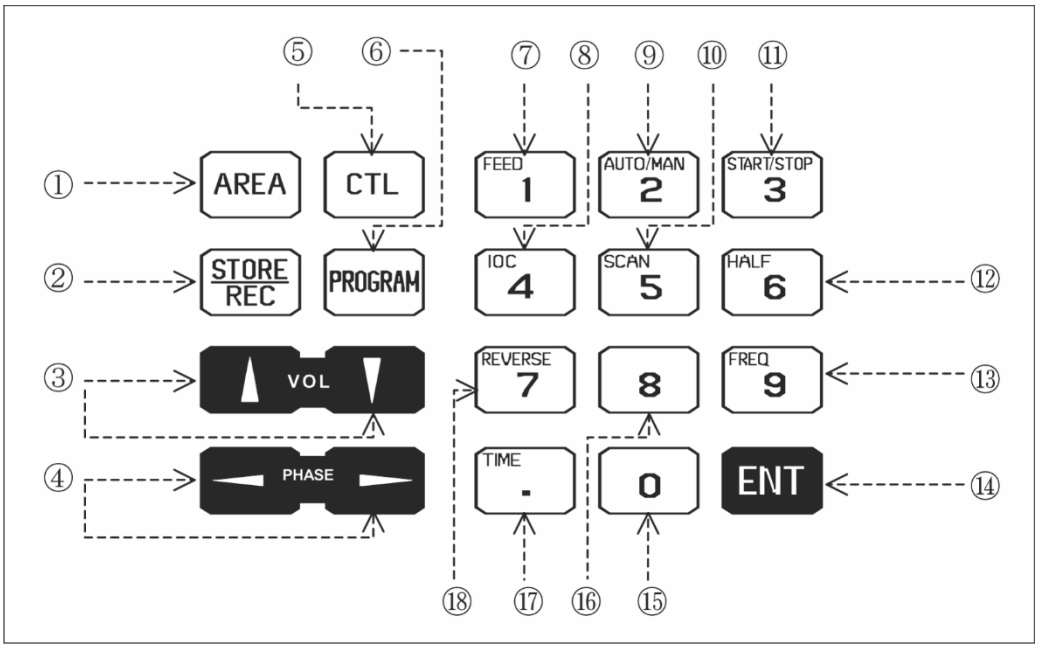


Figure 4.4.1. Radio–facsimile receiver [4.4]

Introduction	The DEGEG 2952 is a fully automatic, self-contained radio facsimile receiver designed to receive radio-facsimile signals in the longwave (LF) and shortwave (HF) bands using a built-in dual conversion super-heterodyne receiver, and to print, from the received signals, weather charts and text information across an 8-inch wide roll of recording paper installed inside its cabinet. A combination of advanced front-end bandpass filtering and 100 Hz tuning step synthesizer allows you to select a desired station with the best sensitivity at any frequency while minimizing intermodulation interference or receiver front-end over-loading from nearby strong transmissions.

Keypad	
Selecting Preprogrammed Facsimile Stations	Pressing [AREA] key to access the area in which the set of parameters of a desired facsimile station is stored. To select the desired area, press the corresponding numeric key. Area 0 – Africa (6VU, ZSC, 5YE) Area 1 – Asia & Far East (BAF, BDF, BMF, HLL, JMH, RBV, UIW, 3SD) Area 2 – South America (CBV, LSB, PWZ) Area 3 – North America (NMC, NMF, NMG, NOJ, CFH, VCO, VFF, etc.) Area 4 – South Pacific, Oceania & Antarctica (KWM, VLM, VMC, VMW, ZKLF) Area 5 – Europe – 1 Northern & Central Europe (DDH, DDK, GYA, OXT, RBW, etc.) Area 6 – Europe – 2 Southern Europe (IMB, SVJ) Area 7 – South Asia & Middle East (ATP, GYA, HSW, JJC, 9VF) Area 8 – Reserved for user–stored stations To select area: 1. Press [AREA] 2. Then [Numeric key] After the desired area is selected, a particular station can be selected in three steps: 1. Press [Up] / [Down] to select its ID/ call sign group. 2. Press [9] to select the desired frequency. 3. Press [ENT] to complete the selection.

SPOS

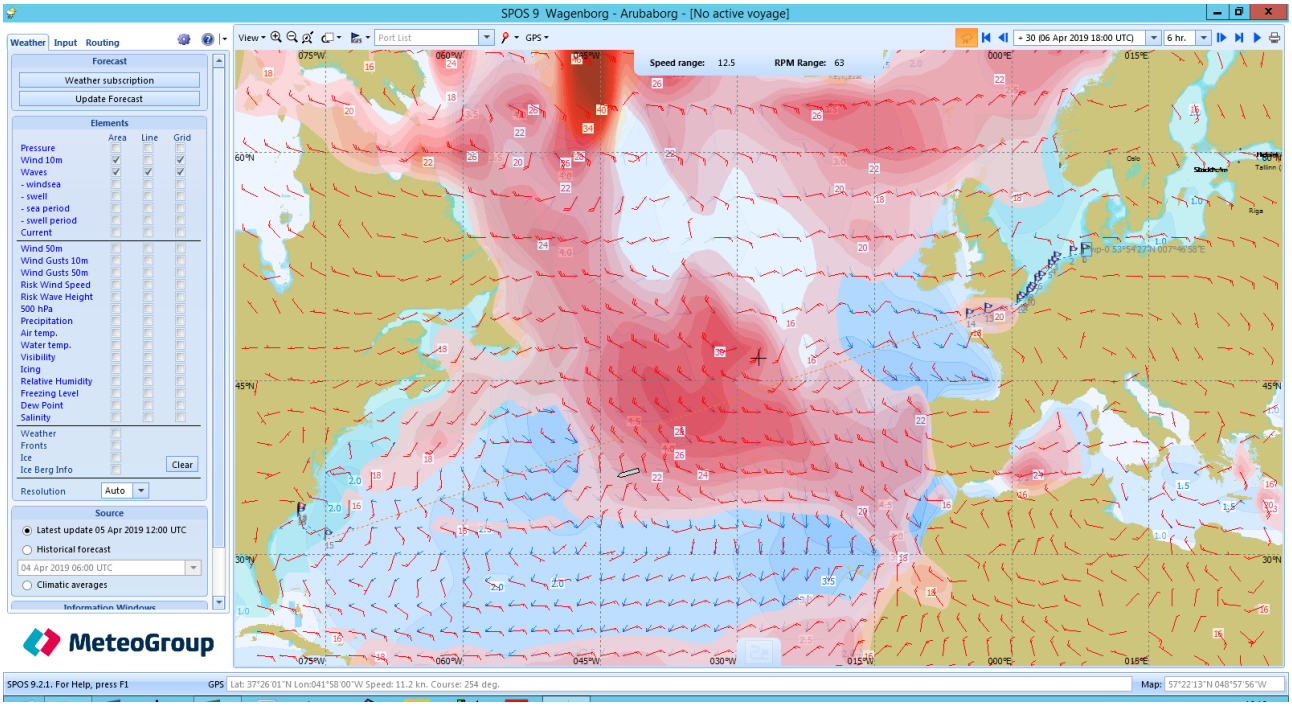


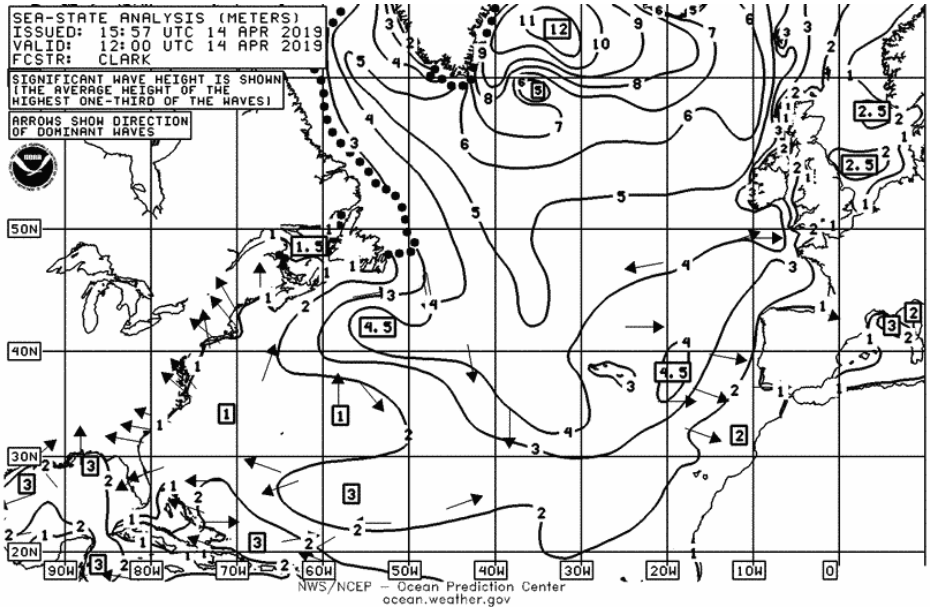
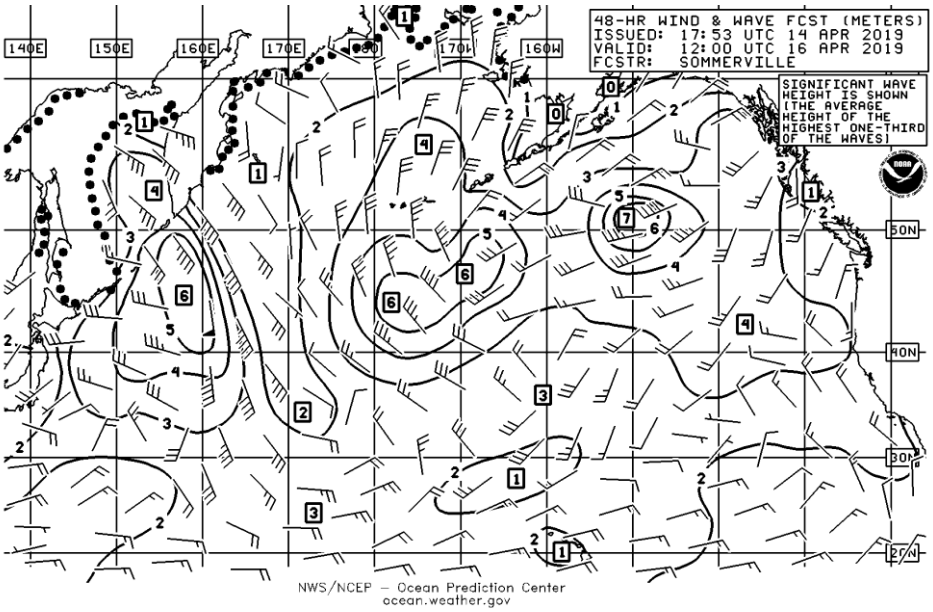
Figure 4.4.2. SPOS [4.4]

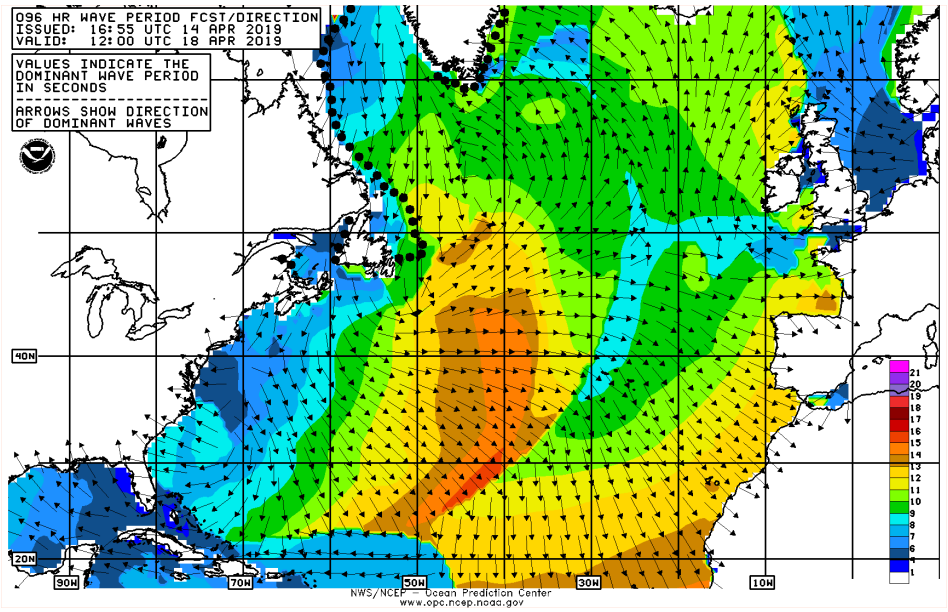
Introduction	Ship Performance Optimization System (SPOS) Onboard is an onboard weather routing system. With SPOS Onboard the ship's route can be optimized, accounting for sea conditions such as waves, current and swell, wind and other weather elements.
Routing	A routing session in SPOS consists of 3 consecutive steps: 1. First update and display the Weather forecast 2. Enter voyage/ship details via the Input screen 3. 3. In the Routing screen, various tracks may be calculated, and the performance can be compared; then the best route can be selected, and the voyage plan can be created and updated.

4.5 SEA STATE CHARTS. TROPICAL CYCLONES.

Определение основных метеоэлементов, зон опасного волнения, высоты волн по картам состояния поверхности моря. Выбор курса и скорости судна в штормовых условиях. Правила расхождения с тропическими циклонами. Руководящие документы.

SEA STATE CHARTS

No.	Chart	Example
1	Sea State Analysis	
2	48-Hour Wind & Wave Forecast	

3	48-Hour and 96-Hour Wave Period & Direction/Ice Accretion Forecast	

TROPICAL CYCLONES

No.	Tropical circulation	Wind force
1	Tropical Depression	7 or less
2	Tropical Storm	8 and 9
3	Severe Tropical Storm	10 and 11
4	Typhoon, Hurricane, Cyclone	12

Precursory signs	The following signs may be evidence of a storm in the locality. The first of these observations is a very reliable indication of the proximity of a storm within 20° or so of the equator. It should be borne in mind, however, that very little warning of the approach of an intense storm of small diameter may be expected. **BAROMETER** If a corrected barometer reading is 3 hPa or more below the mean for the time of year, as shown in the climatic atlas or appropriate volume of Admiralty Sailing Directions, suspicion should be aroused and action taken to meet any development. The barometer reading must be corrected not only for height, latitude, temperature and index error (if mercurial) but also for diurnal variation which is given in climatic atlases or appropriate volumes of Admiralty Sailing Directions. If the corrected reading is 5 hPa or more below normal it is time to consider avoiding action for there can be little doubt that a tropical storm is in the vicinity. Because of the importance of pressure readings, it is wise to take hourly barometric readings in areas affected by tropical storms.

	WIND, SWELL AND CLOUD An appreciable change in the direction or strength of the wind. A long low swell is sometimes evident, proceeding from the approximate bearing of the centre of the storm. This indication may be apparent before the barometer begins to fall. Extensive cirrus cloud followed, as the storm approaches, by altostratus and then broken cumulus or scud. **RADAR** Radar may give warning of a storm within about 100 miles. By the time the exact position of the storm is given by radar, the ship is likely to be already experiencing high seas and strong to gale force winds. It may be in time, however, to enable the ship to avoid the eye and its vicinity where the worst conditions exist.
Avoiding tropical storms	**IN THE N HEMISPHERE** If the wind is veering, the ship must be in the dangerous semicircle. The ship should proceed with all available speed with the wind 10° – 45°, depending on speed, on the starboard bow. As the wind veers, the ship should alter course to starboard thereby tracing a course relative to the storm. If the wind remains steady in direction or nearly steady so that the vessel should be in the path of the storm or very nearly in its path, she should bring the wind well on to the starboard quarter and proceed with all available speed. When well within the navigable semicircle act as below. If the wind backs the ship is in the navigable semicircle. The ship should bring the wind on the starboard quarter and proceed with all available speed turning to port as the wind backs to follow a track relative to the storm. **IN THE S HEMISPHERE** If the wind is backing the ship must be in the dangerous semicircle. The ship should proceed with all available speed with the wind 10° – 45°, depending on speed, on the port bow. As the wind backs the ship should alter course to port thereby tracing a course relative to the storm. If the wind remains steady in direction or nearly steady so that the vessel should be in the path of the storm or very nearly in its path she should bring the wind well on to the port quarter and proceed with all available speed. When well within the navigable semicircle act as below. If the wind veers the ship is in the navigable semicircle. The ship should bring the wind on to the port quarter and proceed with all available speed turning to starboard as the wind veers to follow a track relative to the storm. If there is insufficient room to run when in the navigable semicircle and it is not practicable to seek shelter, the ship should heave-to with the wind on her starboard bow in the N hemisphere or on her port bow in the S hemisphere.

	IF IN HARBOUR When a tropical storm approaches it is preferable to put to sea if this can be done in time to avoid the worst of the storm. Riding out a tropical storm, the centre of which passes within 80 miles or so, in a harbour or anchorage is an unpleasant and hazardous experience especially if there are other ships in company. Even if berthed alongside or if special moorings are used a ship may be far from secure.

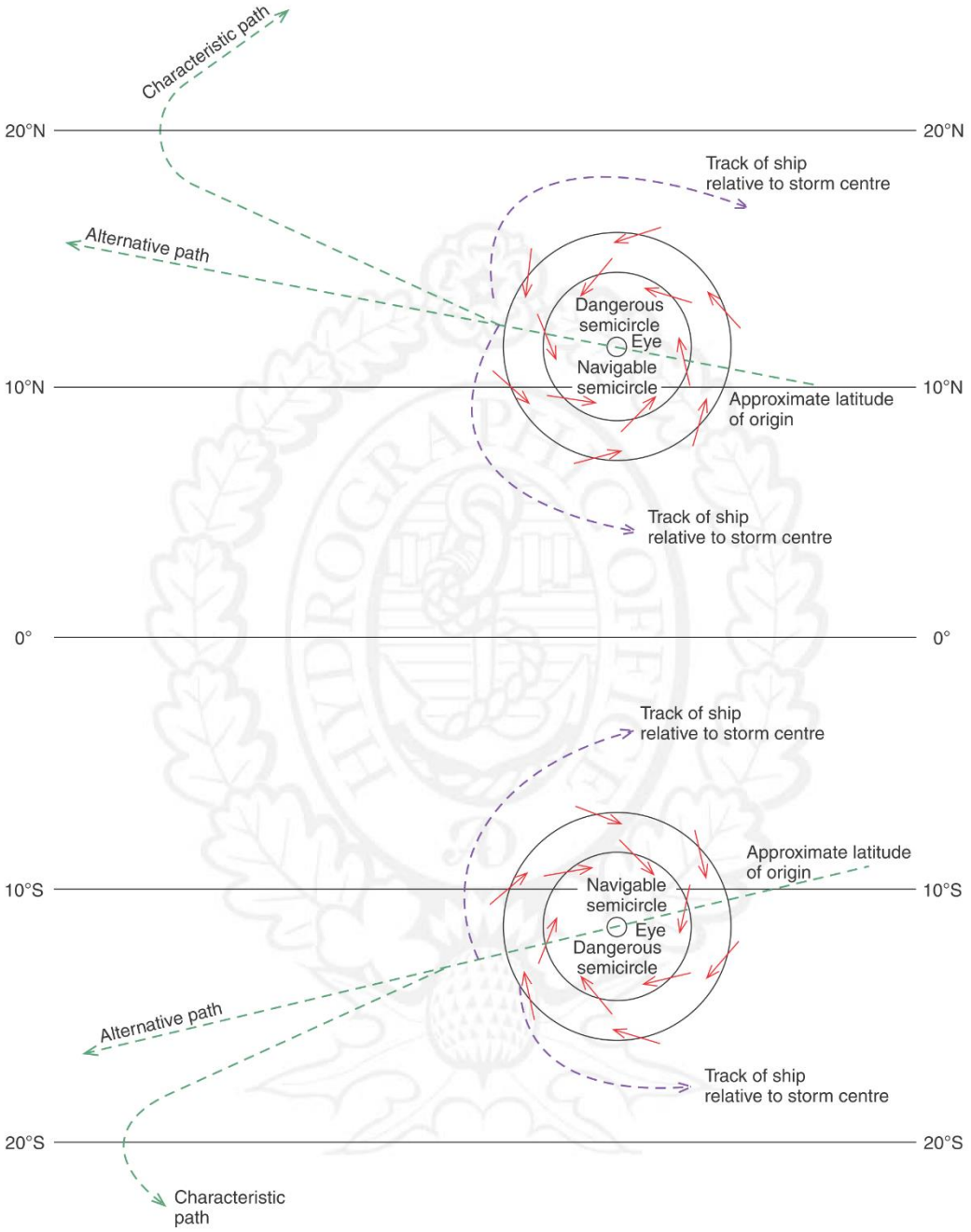


Figure 4.5.1. Avoiding tropical storms [4.5]

5 MARITIME ENGLISH

АНГЛИЙСКИЙ ЯЗЫК

CHAPTER'S CONTENT

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5.1 SMCP. ON-BOARD COMMUNICATION. RECORD KEEPING.

Использование стандартных фраз общения IMO на судне с многоязычным экипажем. Общение по основным вопросам безопасности и навигационной вахты на судне. Ведение вахтенного журнала на английском языке.

STANDARD MARINE COMMUNICATION PHRASES (SMCP)

PART A		**PART B** On-board communication phrases (B)			
A1 External communication phrases	A2 On-board communication phrases (A)	B1 Operative ship-handling	B2 Safety on board	B3 Cargo and cargo handling	B4 Passenger care
A1/1 Distress traffic	A2/1 Standard wheel orders	B1/1 Handing over the watch	B2/1 General activities	B3/1 Cargo handling	B4/1 Briefing and instruction
A1/2 Urgency traffic	A2/2 Standard engine orders	B1/2 Trim, list and stability	B2/2 Occupational safety	B3/2 Cargo care	B4/2 Evacuation and boat drill
A1/3 Safety communications	A2/3 Pilot on the bridge		B2/3 Fire protection and fire fighting		B4/3 Attending to passengers in an emergency
A1/4 Pilotage			B2/4 Damage control		
A1/5 Specials			B2/5 Grounding		
A1/6 Vessel Traffic Service (VTS) standard phrases			B2/6 Search and rescue on-board activities		
Annex Standard GMDSS messages					

ON-BOARD COMMUNICATION PHRASES

B1	**Operative ship-handling**	
B1/1	**Handing over the watch**	
B1/1.1	**Briefing on position, movement and draft**	
	The officer of the watch should brief the relieving officer on the following:	
	1. Position	
	1. The present position is ~ latitude ..., longitude ... . ~ bearing ... degrees, distance ... cables/ nautical miles. ~ buoy ... (charted name). ~ between ... and ... . ~ way point / reporting point	
	2. The next way point / reporting point is	
	3. ETA at ... is ... UTC.	
	4. We are passing / we passed buoy ... (charted name) on port side / starboard side.	
	5. We are approaching buoy ... (charted name) on port side / starboard side.	
	6. Buoy ... (charted name) ... is cables / nautical miles ahead.	
	7. We are entering / we entered area	
	8. We are leaving / we left area	
	Movements	
	1. True course / gyro compass course / magnetic compass course is ... degrees.	
	2. Gyro compass error is ... degrees plus / minus.	1. Magnetic compass error is ... degrees east / west.
	3. Speed over ground/through water is ... knots.	
	4. Set and drift is ... degrees, ... knots.	
	5. We are making ... degrees leeway.	
	6. The course board is written up.	

	7. The next chart is within ... hours.	
	Draft	
	1. Draft forward / aft is ... metres.	
	2. Present maximum draft is ... metres.	
	3. Under keel clearance is ... metres.	
B1/1.2	**Briefing on traffic situation in the area**	
	1. A vessel is ~ overtaking ... (cardinal points) of US. ~ on opposite course. ~ passing on port side / starboard side.	
	2. A vessel is crossing from port side.	1. The vessel ~ will give way. ~ has given way. ~ has not given way yet. ~ is standing on. ~ need not give way.
	3. A vessel is crossing from starboard side.	1. We ~ need not give way. ~ will stand on. ~ will alter course to give way. ~ have altered course to give way. 2. The vessel will pass ... kilometers / nautical miles ahead / astern. 3. I will complete the manoeuvre.
	4. A vessel ... (cardinal points) of us is on the same course.	
	5. The bearing to the vessel in ... degrees is constant.	
	6. There is heavy traffic / ... in the area.	1. There are fishing boats / ... in the area.
	7. There are no dangerous targets on the radar.	1. Attention. There are dangerous targets on the radar.
	8. Call the Master if any vessel passes with a CPA of less than ... miles.	1. Call the Master if... .

B2	**Safety on board**	
B2/1	**General activities**	
B2/1.1	**Raising alarm**	
	1. Operate the general emergency alarm.	
	2. Inform the Master / Chief Engineer /	
	3. Inform the ... coast radio station / vessels in vicinity (on radio).	
	4. Request assistance (on radio) from ... and report.	1. Assistance was ~ requested from ... . ~ offered by ... . ~ accepted from ... .
	5. Transmit a SECURITE / PAN-PAN / distress alert / MAYDAY and report.	1. A SECURITE/ PAN-PAN / distress alert / MAYDAY was transmitted.
	6. Was the distress alert / MAYDAY acknowledged?	1. Yes, the distress alert / MAYDAY was acknowledged by ... coast radio station / MRCC / vessel(s) in vicinity. 2. No, the distress alert was not acknowledged (yet). 3. Repeat the distress alert.

RECORD KEEPING

No.	Logbook	Requirements
1	Deck logbook (Port log)	The following items must be recorded in the deck logbook: Commencement and end of cargo operations Weather conditions Number of stevedores working gangs Stevedore working times, including normal breaks or breaks because of incidents (for instance weather circumstances) Safety briefings Incidents that occurred during the watch, for instance cargo damage Instructions for transfer of duties with respect to: Ballast operations (trim, maximum draft, forces) Cargo operations When to call the master
2	Bridge logbook	*Reference: 1.6 Bridge log book entries*

5.2 SMCP. DISTRESS AND URGENCY.

Стандартные фразы общения IMO. Основы связи. Сообщения при бедствии и срочные сообщения. Использование стандартных фраз общения IMO при поисково-спасательных операциях.

DISTRESS AND URGENCY

A1	**External communication phrases**	
A1/1	**Distress traffic**	
	The distress traffic controlling station/other stations may impose radio silence on any interfering stations by using the term: *"Seelonce Mayday/Distress",* *unless the latter have messages about the distress.*	
AI/1.1	**Distress communications**	
	A distress traffic has always to commence with stating the position of the vessel in distress, if it is not included in the DSC distress alert.	
A1/2	**Urgency traffic**	
	Safety of a vessel (other than distress). An urgency traffic has always to commence with stating the position of the calling vessel if it is not included in the DSC alert.	
Annex	**Standard GMDSS messages**	
	STANDARD DISTRESS MESSAGE Upon receipt of a DSC Distress Alert acknowledgement, the vessel in distress should commence the distress traffic on one of the international distress traffic frequencies such as VHF Channel 16 or frequency 2182 kHz (if not automatically controlled) as follows: MAYDAY (repeated three times) THIS IS The 9-digit Maritime Mobile Service Identity code (MMSI)	

	Name / call sign or other identification of the vessel calling The position of the vessel The nature of distress The assistance required Any other information which might facilitate rescue. **STANDARD URGENCY MESSAGE** After the transmission of a DSC Urgency Call, switch the transmitter to VHF Channel 16 or frequency 2182 kHz (if not automatically controlled) and commence the urgency traffic as follows: PAN-PAN (repeated three times) ALL STATIONS (repeated three times) THIS IS The 9-digit Maritime Mobile Service Identity code (MMSI) Name / call sign or other identification of the vessel calling The position of the vessel The text of the urgency message. **STANDARD SAFETY MESSAGE** After the transmission of a DSC Safety Call, switch the transmitter to VHF Channel 16 or frequency 2182 kHz (if not automatically con-trolled) and transmit the safety message as follows: SECURITE (repeated three times) ALL STATIONS (or all ships in a specific geographical area, or to a specific station) (repeated three times) The 9-digit Maritime Mobile Service Identity code (MMSI) Name / call sign or other identification of the vessel calling The position of the vessel The text of the safety message.	

5.3 SMCP. PILOTAGE.

Стандартные фразы и общения IMO. Лоцманская проводка.

PILOTAGE

A1	**External communication phrases**	
A1/4	**Pilotage**	
AI/4.1	**Pilot request**	
AI/4.2	**Embarking/disembarking pilot**	
	1. Stand by pilot ladder.	
	2. Rig the pilot ladder on port side / starboard side ... metres above water.	
	3. The pilot ladder is rigged on port side / starboard side.	
	4. You must rig another pilot ladder.	
	5. The pilot ladder is unsafe.	
	6. What is wrong with the pilot ladder?	1. The pilot ladder ~ has broken / loose steps. ~ has broken spreaders. ~ has spreaders too short. ~ is too far aft / forward.
	7. Move the pilot ladder ~ ... metres aft / forward. ~ clear m of discharge.	
	8. Rig the accommodation ladder in combination with the pilot ladder.	
	9. Rig the pilot ladder alongside hoist.	
	10. Put lights on at the pilot ladder.	
	11. Man-ropes are required / not required.	
	12. Have a heaving line ready at the pilot ladder.	
	13. Correct the list of the vessel.	
	14. Make a lee on your port side / starboard side. 15. Steer ... degrees to make a lee.	

	16. Keep the sea on your port quarter / starboard quarter.	
	17. Make a boarding speed of... knots.	
	18. Stop engine(s) until pilot boat is clear.	
	19. Put helm hard to port / starboard.	
	20. Alter course to ... (cardinal points) — the pilot boat cannot clear the vessel.	
	21. Put engine(s) ahead / astern.	
	22. Embarkation is not possible.	1. Boarding arrangements do not comply with SOLAS Regulations. 2. Vessel is not suited for the pilot ladder.

5.4 SMCP. HELICOPTERS AND ICEBREAKERS. VTS.

Использование стандартных фраз общения IMO при переговорах с другими судами и летательными аппаратами. Связь с ледоколом и вертолетом. Использование стандартных фраз общения IMO при переговорах с береговыми станциями.

HELICOPTERS AND ICEBREAKERS. VTS.

A1	**External communication phrases**	
A1/5	**Specials**	
AI/5.1	**Helicopter operations**	
	(H: = from helicopter V: = from vessel)	
	1. V: I require a helicopter. ~ to pick up persons. ~ with doctor. ~ with life-raft /	1. MRCC: I will send a helicopter with ... .
	2. H: MV ... , I will drop	
	3. H: MV ... , are you ready for the helicopter?	1. V: Yes, I am ready for the helicopter. 2. V: No, I am not ready for the helicopter (yet). 3. V: Ready for the helicopter in ... minutes.
	4. H: MV ... , helicopter is on the way to you.	
	5. H: MV ... , what is your position?	1. V: My position is ... .
	6. H: MV ... , what is your present course and speed?	1. V: My present course is ... degrees, speed is ... knots.
	7. H: MV ... , make identification signals.	1. V: I am making identification signals by smoke (buoy) / search light / flags / signaling lamp / ... .
	8. H: MV ... , you are identified.	
	9. H: MV ... , what is the relative wind direction in degrees and knots?	1. V: The relative wind direction is ... degrees and ... knots.

	10. H: MV ... , keep the wind on port/starboard bow.	
	11. H: MV ... , keep the wind on port/starboard quarter.	
	12. H: MV ... , indicate the landing / pick-up area.	1. V: The landing / pick-up area is ... .
	13. H: MV ... , can I land on deck?	1. V: Yes, you can land on deck. 2. V: No, you cannot land on deck (yet). 3. V: You can land on deck in ... minutes.
	14. H: MV ... , I will use hoist / rescue sling / rescue basket / rescue net / rescue litter / rescue seat / double lift.	
	15. V: I am ready to receive you.	
	16. H: MV... , I am landing.	
	17. H: MV ... , I am starting operation.	
	18. H: MV ... , do not fix the hoist cable.	
	19. H: MV ... , operation finished.	
	20. H: MV ... , I am taking off.	
AI/5.2	**Ice- breaker operations**	
	Ice – breaker request	
	1. I am / MV is fast in ice in position	
	2. I require / MV ... requires ice-breaker assistance to reach	
	3. Ice-breaker assistance ~ will arrive at ... UTC / within ... hours. ~ is not available until... UTC. ~ is available only up to latitude ... longitude ... . ~ is suspended until ... (date and time). ~ is suspended after sunset. ~ is suspended until favourable weather conditions. ~ will be resumed at ... UTC.	
	Ice-breaker assistance for convoy	
	Ice-breaker commands applying to all the vessels in a convoy have to be immediately confirmed consecutively by each vessel in turn. Icebreaker commands applying to a	

	single vessel are confirmed and executed only by that vessel, this applies also for close coupled towing. When being assisted by an ice-breaker it is important to maintain a continuous listening watch on the appropriate VHF Channel and to maintain a proper lookout for sound and visual signals.	
	1. Ice breaker assistance for convoy will start now /at ... UTC.	
	2. Your place in convoy is number	
	3. MV ... will follow you.	
	4. You will follow MV	
	5. Go ahead and follow me.	1. Do not follow me.
	6. Proceed along the ice channel.	
	7. Increase / reduce your speed.	
	8. Reverse your engines.	
	9. Stop engines.	
	10. Keep a distance of... metres / cables between vessels.	
	11. Increase/reduce the distance between vessels to ... metres / cables.	
	12. Stand by for receiving towing line.	1. Stand by for letting go towing line.
	13. Switch on the bow/stern search light.	
	14. Stop in present position.	
	15. Ice-breaker ... will escort you.	
	16. Ice-breaker assistance for convoy finished.	1. Open water / light ice conditions ahead.
	17. Proceed by yourself (to area ...).	
	Ice – breaker assistance in close-coupled towing	
	1. Stand by for close coupled towing.	
	2. Slack out your anchors under the hawse-pipes.	
	3. Pass heaving lines through the hawse-pipes.	

	4. Receive towing line on deck.	
	5. Lash together the eyes of the towing line with manila lashing.	
	6. Fasten towing line on your bitts.	
	7. I start to draw your bow into the stem notch of the icebreaker.	
	8. Stand by for cutting the manila lashing if required.	
	9. Keep yourself in the centre-plane of the ice-breaker.	
A1/6	**Vessel Traffic Service (VTS) standard phrases**	
AI/6.1	**Phrases for acquiring and providing data for a traffic image**	
	Acquiring and providing routine traffic data	
	1. What is the name of your vessel and call sign / identification?	1. The name of my vessel is ..., call sign ... / identification ... . 2. Spell the name of your vessel.
	2. What is your flag state?	1. My flag state is ... .
	3. What is your position?	1. My position is ... .
	4. What is your present course and speed?	1. My present course is ... degrees, my speed is ... knots.
	5. From what direction are you approaching?	1. I am approaching from ... .
	6. What is your port of destination / destination?	1. My port of destination / destination is ... .
	7. What was your last port of call?	1. My last port of call was ... .
	8. What is your ETA in position ... ?	1. My ETA is ... UTC.
	9. What is your ETD from ... ?	1. My ETD from ... is ... UTC.
	10. What is your draft forward / aft?	1. My draft forward/aft is ... metres.
	11. What is your present maximum draft ?	1. My present maximum draft is ... metres.
	12. What is your freeboard?	1. My freeboard is ... metres.
	13. What is your air draft?	1. My air draft is ... metres.

	14. Are you underway?	1. Yes, I am underway. 2. No, I am not underway. 3. I am ready to get underway.
	15. What is your full speed/full manoeuvring speed?	1. My full speed / full manoeuvring speed is ... knots.
	16. What is your cargo?	1. My cargo is ... .
	17. Do you carry any dangerous goods?	1. Yes, I carry the following dangerous goods: ... kilogrammes / tonnes IMO Class ... . 2. No, I do not carry any dangerous goods.
	18. Do you have any deficiencies / restrictions?	1. No, I have no deficiencies / restrictions. 2. Yes, I have the following deficiencies / restrictions: ... .
	19. I am / MV ... is constrained by draft.	
	20. The maximum permitted draft is ... metres.	
	21. Do you have any list?	1. Yes, I have a list to port/starboard of... degrees. 2. No, I have no list.
	22. Are you on even keel?	1. Yes, I am on even keel. 2. No, I am trimmed by the head/stern.

5.5 SHIP'S CORRESPONDENCE

Деловая переписка.

Statement of Fact:

Recent years, as the Internet has been fitted on board, emails are used as a correspondence between a vessel and the world, i.e. the office, agents, etc.

In some particular cases, hard-copy versions of some documents can be sent by post office via agencies.

AMOS MAILBOX

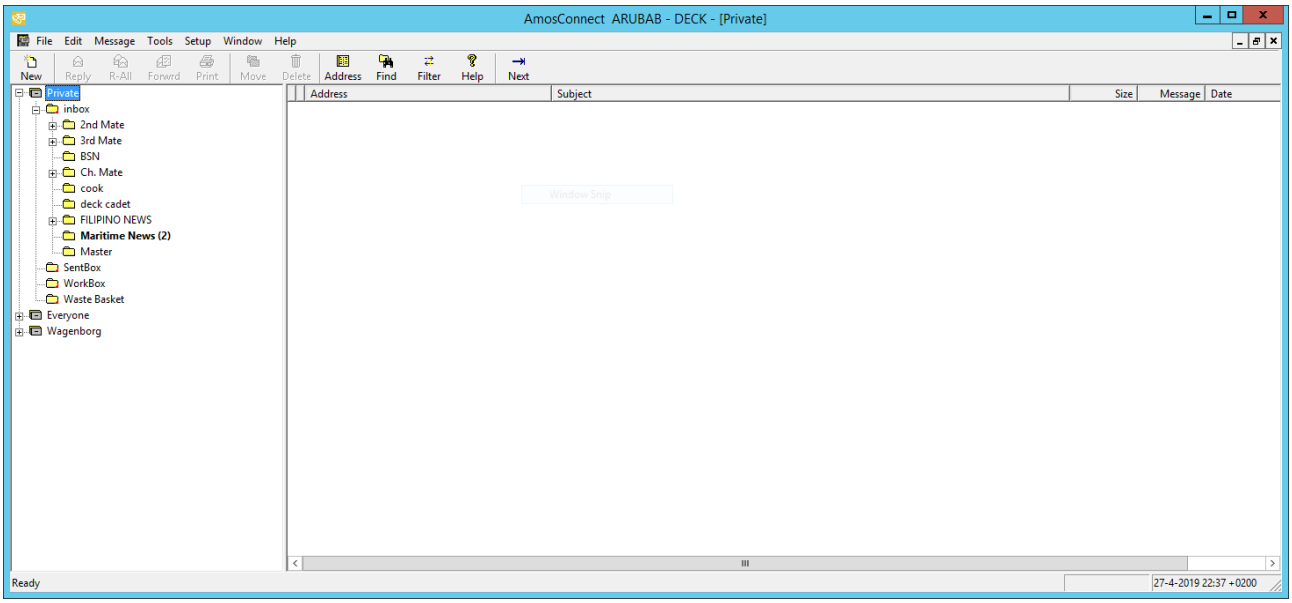

Figure 5.5.1. The vessel's AMOS Mailbox [5.5]

General information	The vessel's AMOS mail operates through a variety of possible satellite connections, therefore sending messages can be very expensive. Only the master is authorized to make the send connection.
Business use	The vessel's AMOS mail operates through the INMARSAT/ CASTOR/ MARLINK satellite connection, therefore sending messages can be very expensive. The e-mail connection Amos-ship to Amos-office is set to 10 minutes. If this is not working only the master is authorized to make the send connection. E-mails for business use may be sent by the master, chief officer and chief engineer only.

5.6 SHIP'S DOCUMENTATION

Ведение судовой документации на английском языке.

No.	Document	Reference
1	Bridge log book	
2	Deck log book	
3	Ballast exchange record	
4	Weather record	
5	Voyage planning for ECDIS	
6	Pilot cards	
7	Stevedores damage report	
8	Toolbox meeting Permit to work	
9	Chart and publication correction record	
10	Arrival documents (e.g. Crew's effects declaration)	

6 ELECTRO-NAVIGATIONAL EQUIPMENT

ЭЛЕКТРОНАВИГАЦИОННЫЕ ПРИБОРЫ

CHAPTER'S CONTENT

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6.1 BRIDGE ARRANGEMENT DRAWING. NAVIGATIONAL TECHNICAL EQUIPMENT.

Схема размещения приборов на ходовом мостике. Приборы ТСС. Тип, компания-изготовитель, состав комплекта и назначение каждого прибора комплекта, размещение приборов комплекта на судне, техникоэксплуатационные характеристики.

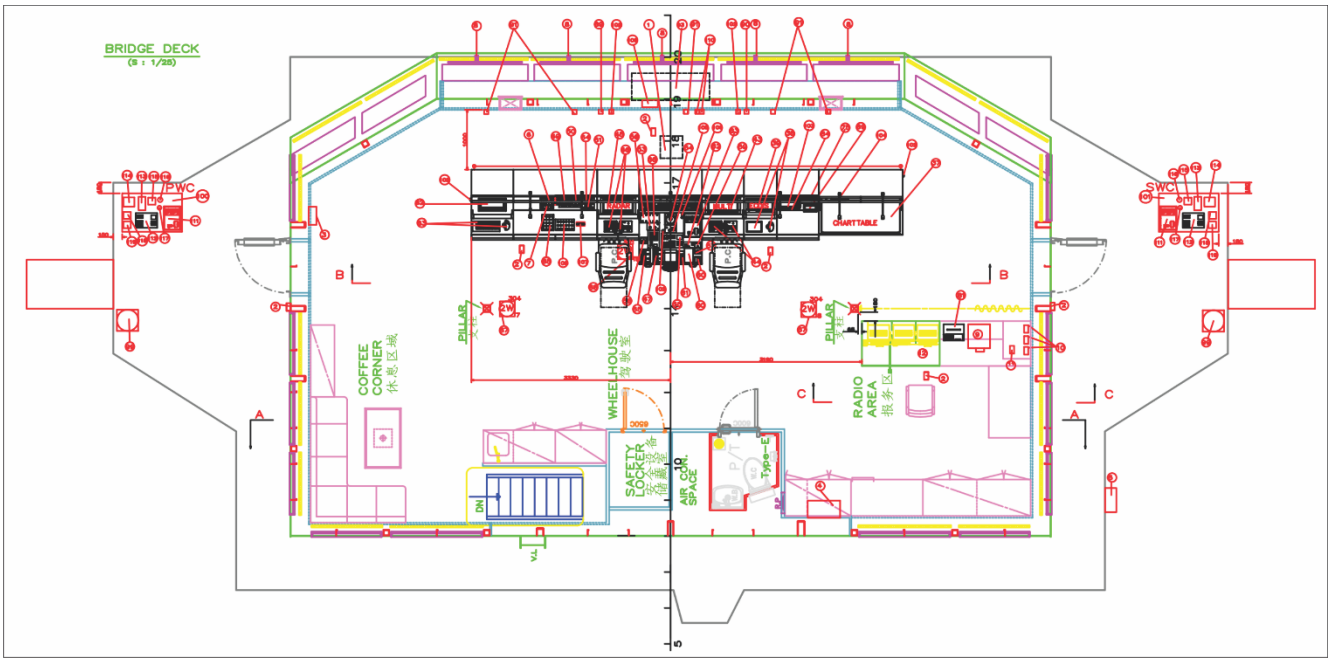


Figure 6.1.1. Arrangement of wheelhouse, chart and radio space [6.1]

The focused navigational technical equipment/ aids:

	Magnetic compass		Autopilot		Log speed
	Gyro compass		ECDIS		Echo-sounder
	GPS receiver		Radar		ARPA
	NAVTEX receiver		GMDSS equipment		AIS

6.2 MAGNETIC COMPASS

Магнитный компас. Таблица девиации, дата последнего уничтожения девиации. Способы контроля поправки магнитного компаса.

Figure 6.2.1. Magnetic compass (Spare) [6.2]

TECHNICAL DATA

Manufacturers *Производитель*	Cassens & Plath GmbH Germany
Model *Модель МК*	Magnetic Bearing Compass Binnacle Bearing Binnacle/180
Type *Тип МК*	Magnetic bearing/reflector compass Type 11
Reflection *Дистанционный (да/нет)*	N/A
Type of directional system *Тип МЧЭ*	Directional system assembly comprising: Card and float

MAGNETIC COMPASS DEVIATION TABLE

1-800-624-6389
Fax: 1-908-757-0729
magnetx@comcast.net

U.S. Coast Guard
Licensed Personnel

Professional
Compass
Adjustments

College Park Marine, Inc.

Commercial &
Military
Vessels

300 Maple Ave., Suite 203, South Plainfield, New Jersey 07080

TABLE OF RESIDUAL DEVIATION

Vessel: **MV ARUBABORG**
Agent/Owner: Wilhelmsen
Compass Make: **Cassens & Plath** Model: **A290504**
Position: $\varphi = 39° 55.0'N, \lambda = 075° 08.0'W$ Date: **06th September 2018**

Ship's Head Magnetic	DEVIATIONS		Ship's Head Magnetic	DEVIATIONS	
	Standard Compass	Steering Compass		Standard Compass	Steering Compass
000°	−2.8°		180°	+1.2°	
015°	−3.0°		195°	+0.5°	
030°	−3.5°		210°	0.0°	
045°	−3.8°		225°	−0.8°	
060°	−3.5°		240°	−0.8°	
075°	−2.5°		255°	−1.0°	
090°	−1.8°		270°	−1.0°	
105°	−1.0°		285°	−1.0°	
120°	0.0°		300°	−1.5°	
135°	+1.2°		315°	−2.0°	
150°	+1.2°		330°	−2.0°	
165°	+1.2°		345°	−2.8°	
180°	+1.2°		000°	−2.8°	

A check of compass deviations should be completed at least once yearly to account for magnetic decay and/or changes. Industry and military standards recommend that a magnetic compass be professionally inspected and adjusted annually.

Adjusted By: (signed) Date: 06th September 2018

Figure 6.2.2. Table of residual deviation [6.2]

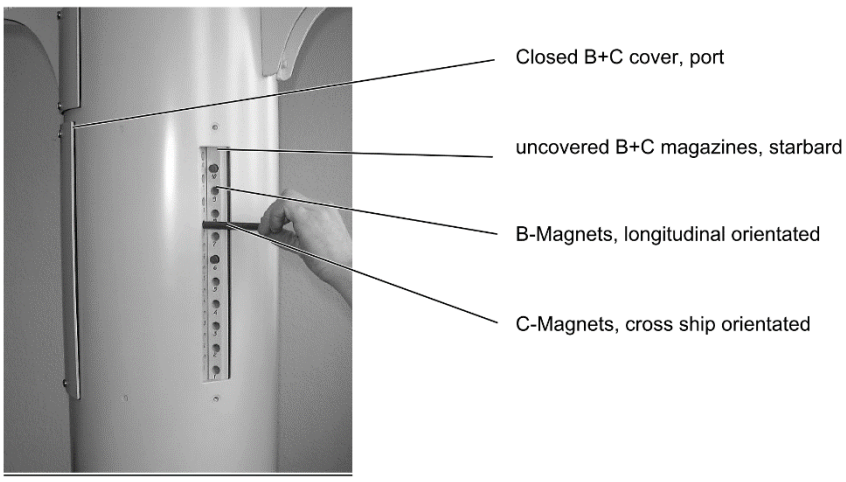
Date	06.09.2018	*Position*	$\varphi = 39° 55.0'N, \lambda = 075° 08.0'W$

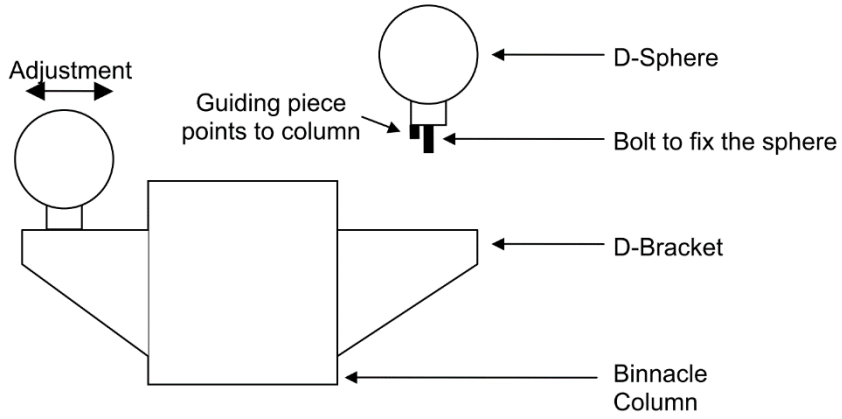
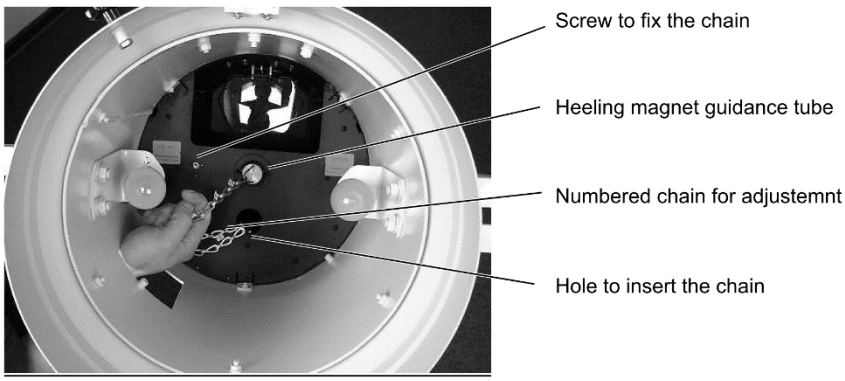
COMPASS ERROR CONTROL METHODS

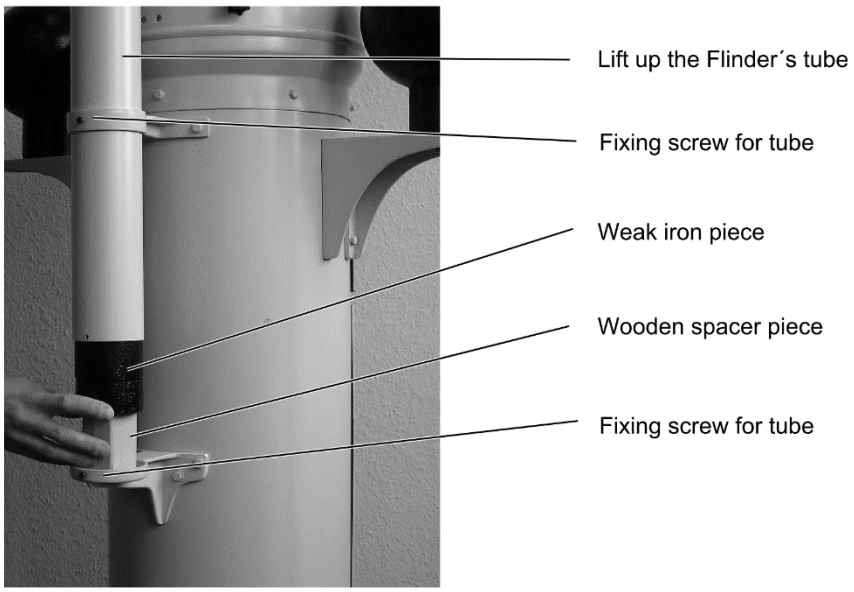
$CSE_{True} = CSE_{Magnetic} + \Delta_{Magnetic} = CSE_{Gyro} + \Delta_{Gyro}$ $\Delta_{Magnetic} = \delta_{Deviation} + d_{Variation}$ $d_{Variation} = d_{Charted} + \Delta d \cdot \Delta T = d_{Charted} + \Delta d \cdot (2019 - [Year]_{Charted})$
$BRG_{True} = BRG_{Magnetic} + \Delta_{Magnetic} = BRG_{Gyro} + \Delta_{Gyro}$

No.	**Method**	**Explanation**
1	By leading light	$\Delta_{Compass} = BRG_{Leading\ light\ \mid True} - BRG_{Compass}$
2	By landmark	$\Delta_{Compass} = BRG_{Landmark\ \mid True} - BRG_{Compass}$
3	By astronomical observation	$\Delta_{Compass} = A_{True} - BRG_{Compass}$

COMPASS ADJUSTMENT

No.	Correction	Description
1	**A-Correction**	This is to correct the alignment error of the compass binnacle: Compass ahead and ships ahead have to be corresponding. For correction loosen the binnacle fixing bolts in the base. Oblong holes in the base allow to turn the binnacle column by +/-5° around its vertical axis. Attach the azimuth device and take a bearing of a midship object like masts (provided the compass binnacle itself is located midships) and turn the binnacle so that the index mark of the azimuth device shows "000" at the divided verge ring on top of the compass.
2	**B+C-Correction**	At delivery 6 B+C magnets (10 mmØ x 200 mm) are to be found in their magazines behind the relevant covers. See chapter "Compass Binnacle, Outline". These are to correct the errors caused by the ship's permanent longitudinal and cross magnetism. The B-corrector compensates the longitudinal and the C-corrector the athwartship field. The following picture is to identify the magnets. B-magnets are longitudinal, and C-magnets are transversal orientated. Correction of +/-40° deviation is possible to meet the regulations. Choose quantity, orientation and position of magnets as required. There are 2x10 holes to put in the B-magnets (10 each on port and starboard) and 1x10 holes to put in the C-magnets. This enables sufficient fine adjustment. Start inserting magnets from the lowest position. The holes are numbered to note the magnet positions required in the compass diary. 
3	**D-Correction**	At delivery the D-brackets are mounted at the binnacle column and the D-spheres are packed separately. D-adjustment is necessary for correction of the ship's symmetrical weak iron influence. For attaching there are bolts and washers. The guiding piece of the sphere runs in the slit of the bracket and secures the sphere against rotating. The guiding piece is orientated towards

		the binnacle column. There are index marks at the spheres and scales at the D-bracket to note the position in the deviation diary. For D-correction the sphere has to be approached or drawn away from the binnacle column. 
4	**E-Correction**	Is used for correction of the ship's asymmetrical weak iron field. This compass binnacle does not include this corrector because according to regulations it should be installed in the ship's centre line where the influence does not occur. If it is necessary to move the compass binnacle to port or starboard, then the iron free zone has to be moved correspondingly to reduce the deflection.
5	**Heeling Correction**	At delivery the heeling magnet is to be found within the heeling guidance tube. The heeling corrector is to neutralize the ship's permanent vertical field. Remove the compass from the binnacle and inside the chain to lift up and lower the heeling magnet will be visible (See the following picture). Pull out the chain to get the brass tube containing the magnets. To open the tube, unscrew the cover. There are two magnets (25 mm and 125 mm length, both 25 mm ∅). For adjustment one or both magnets may be used and combined as required. After adjustment the chain should be fixed by screw at its final position. If the compass is at its position within the binnacle one can reach the heeling corrector chain by removing the relevant cover. 

6	**Flinder's bar (Extra)**	If ordered four D-cylinders (305 mm, 152 mm, 76 mm, 38 mm length, all 78 mmØ) are separate included to delivery. The Flinder's tube is fixed to the binnacle column and in it there are four wooden spacers (280 mm, 140 mm, 70 mm, 35 mm). The Flinder's bar is used to correct the longitudinal field (B2) caused by the ship's weak iron. The first adjustment of Flinder's bar on maiden voyage remains preliminary because the latitude influence cannot be established at that time. When passing the equator at first sufficient deviation data has to be collected to allow the final adjustment. On locally operating vessels like harbour tugs or in coastal fishery a Flinder's bar is not necessary. Open the Flinder's tube by removing the upper plastic cover. For adjustment lift up tube to allow access to the weak iron cores and the wooden spacer pieces. Loosen the tube by unscrewing the fixing screws at the upper and lower Flinder's bracket. 

DETERMINATION OF COMPASS DEVIATION

$$\delta° = D° \cdot \sin(2 \cdot CSE) + E° \cdot \cos(2 \cdot CSE) + A° \pm (B° \cdot \sin CSE) + C° \cdot \cos CSE$$

6.3 GYRO COMPASS

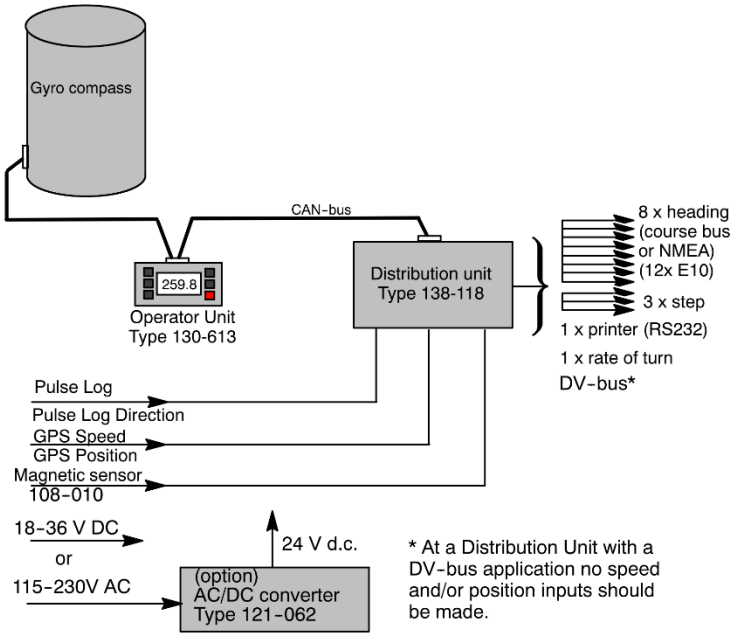
Гирокомпас. Способ подвеса чувствительного элемента. Способы контроля работоспособности гирокомпаса штурманом на ходовой вахте. Приёмники информации о курсе судна и способы её передачи. Виды информации, поступающей в гирокомпас, и их источники.

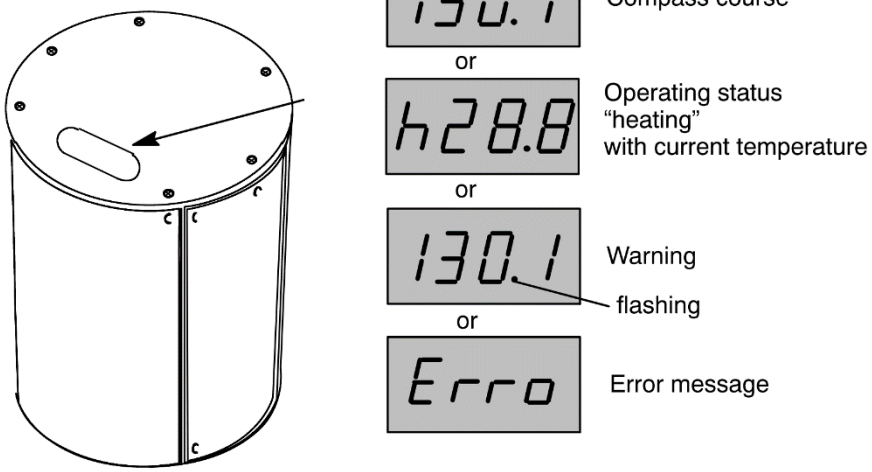
Figure 6.3.1. Gyro compass STD 22 [6.3]

GENERAL TECHNICAL DATA

Manufacturers *Производитель*	Raytheon Anschütz GmbH, Germany	*Датчик угла*	
Model *Модель ГК*	STD 22 Gyro Compass	*Демпфирующее устройство*	
Type *Тип ГК*	Type 110-233	*Регулировка ТНК*	

Gyrosphere *Тип ЧЭ*	111-006 Gyrosphere	**Speed Error Correction** *Ввод скоростной поправки*	Automatic correction of a course, related to speed and degree of latitude
Подвес ЧЭ	Supporting liquid	*Инерционная погрешность 1 рода*	
Плавучесть ЧЭ		*Инерционная погрешность 2 рода*	
Центрирование ЧЭ		*Потребление э/энергии*	
Supply voltage *Подвод э/питание гироскопов*	18 – 36 V (DC)	*Вид охлаждения*	
Количество фаз э/питание гироскопов		**Operational temperature** *Температура стабилизации ПЖ*	45 °C
Supporting liquid *Состав ПЖ*	Distilled water (230 cm^3) Supporting liquid (840 cm^3)	*Подвес следящей сферы*	

Inputs and outputs	

	The input interfaces on the STD 22 are as follows: - NMEA Position - NMEA Speed - Status signals or pulses (Pulse Log Direction, Pulse Log) The output interfaces on the STD 22 are as follows: - Course (corrected – SEC) as NMEA or course bus - Data bus (CAN-Bus) - Status signals (alarms, error messages, warnings) - Step (6 steps/degree) - RS 232 for course-printer connection - Rate of turn - DV-bus
Controls and indicators	Digital indication of the following: Compass course Operating status Warnings Error messages 

6.4 COURSE INDICATORS' COMPARISON

Сравнение истинного курса судна по гирокомпасу с путевым углом приёмоиндикатора СРНС NAVSTAR GPS. Объяснение расхождению этих величин. Сличения гирокомпаса с магнитным компасом. Расчёты по сличению. Расчёт скоростной девиации гирокомпаса. Расчёт поправки курсоуказателя по удалённому ориентиру. Определения поправок гирокомпаса с интервалом через 30 минут при движении на прямом курсе, график изменения поправок.

GYRO COMPASS VS MAGNETIC COMPASS

$$CSE_{True} = CSE_{Magnetic} + \Delta_{Magnetic} = CSE_{Gyro} + \Delta_{Gyro}$$
$$\Delta_{Magnetic} = \delta_{Deviation} + d_{Variation}$$
$$d_{Variation} = d_{Charted} + \Delta d \cdot \Delta T = d_{Charted} + \Delta d \cdot (2019 - [Year]_{Charted})$$

No.	Date/ Time	Position/ Chart	CSE_{Gyro} Δ_{Gyro}	$CSE_{T\|G}$	CSE_{Mag} δ d	$CSE_{T\|M}$	$\Delta CSE_{T\|G-M}$	Remark
1	01.04.2019 18.00	46° 09.7′N 019° 27.8′W	239.1° +0.1°	239.2°	248.0° −0.9°, −8	239.1°	**+0.1°**	
2	02.04.2019 20.00	43° 29.9′N 025° 59.0′W	240.3°	240.4°	250.0° −0.9°, −10	239.1°	**+1.3°**	
3	03.04.2019 18.00	41° 02.1′N 031° 42.1′W	239.9°	240.0°	252.0° −0.9°, −11	240.1°	**−0.1°**	
4	04.04.2019 20.00	38° 31.6′N 037° 59.1′W	250.0°	250.1°	263.0° −1.0°, −12	250.0°	**0.0°**	
5	05.04.2019 20.00	37° 10.2′N 043° 44.3′W	258.1°	258.2°	272.0° −1.0°, −14	257.0°	**+1.1°**	
6	06.04.2019 16.00	36° 06.8′N 048° 52.6′W	257.9°	258.0°	274.0° −1.0°, −15	258.0°	**−0.1°**	
7	08.04.2019 20.00	34° 00.9′N 062° 04.9′W	266.0°	266.1°	283.0° −1.0°, −16	266.0°	**+0.1°**	
8	09.04.2019 14.00	33° 45.9′N 066° 36.2′W	265.8°	265.9°	283.0° −1.0°, −14	268.0°	**−2.1°**	
9	10.04.2019 18.00	33° 28.8′N 073° 04.8′W	266.2°	266.3°	282.0° −1.0°, −13	268.0°	**−1.7°**	
10	16.04.2019 20.00	23° 33.9′N 082° 53.4′W	259.0°	259.1°	262.0° −1.0°, −5	256.0°	**+3.1°**	

GYRO COMPASS VS GPS

$$CSE_{True} = CSE_{Gyro} + \Delta_{Gyro}$$
$$COG = CTS + \alpha_{Leeway} + \beta_{Drift}$$
$$CTS = HDG = CSE_{True}$$

No.	Date/ Time Position/ Chart	CSE_{Gyro} Δ_{Gyro}	$CSE_{T\|G}$	$CSE_{GPS} = COG$ Leeway Set Drift	α_{Leeway} β_{Drift}	$CSE_{T\|GPS} = CTS = HDG$	$\Delta CSE_{T\|G-GPS}$	Remark
1	17.04.2019 18.00 22° 34.4′N 088° 16.0′W	252.0° +0.1°	252.1°	252.0°	106.4° 26.0 kn 215.3° 1.8 kn	252.2°	**−0.1°**	
2	18.04.2019 12.45 21° 26.2′N 092° 14.9′W	232.9° +0.1°	233.0°	238.0°	143.7° 29.5 kn 169.5° 1.2 kn	233.3°	**−0.3°**	
3	19.04.2019 19.00 19° 08.3′N 096° 03.1′W	242.9° +0.1°	243.0°	239.0°	75.0° 13.5 kn 178.3° 1.9 kn	242.5°	**+0.5°**	
4	22.04.2019 12.15 21° 12.1′N 096° 51.7′W	335.9° +0.1°	336.0°	336.0°	175.2° 14.9 kn 305.7° 2.2 kn	335.7°	**+0.3°**	
5	24.04.2019 19.20 22° 31.8′N 097° 42.2′W	053.6° +0.1°	053.7°	049.0°	138.1° 19.2 kn 355.5° 2.3 kn	054.1°	**−0.4°**	

GYRO COMPASS'S SPEED ERROR

$$CSE_{True} = CSE_{Gyro} + \delta_V$$

$$\delta_V = -\frac{V \cos CSE_{Gyro}}{15 \cos \varphi}$$

$$\delta_V{}' = -\frac{V \cos COG}{15 \cos \varphi}$$

Date/ Time **Position/ Chart**	CSE_{Gyro}	COG	φ	V	**Speed error table**	**Formulas** $\delta_V = -\frac{V \cos CSE_{Gyro}}{15 \cos \varphi}$ $\delta_V{}' = -\frac{V \cos COG}{15 \cos \varphi}$	CSE_{True}
22.04.2019 12.25 22° 31.8′*N* 097° 42.2′*W*	335.2°	335.0°	22° 31.8′*N*	Log 12.2 *kn* SOG 14.5 *kn*	−0.89′	$\delta_V = -0.9414$ $\delta_V' = -0.9399'$	

DETERMINING COMPASSES' ERRORS BY LEADING LIGHTS

$$CSE_{True} = CSE_{Magnetic} + \Delta_{Magnetic} = CSE_{Gyro} + \Delta_{Gyro}$$
$$\Delta_{Magnetic} = \delta_{Deviation} + d_{Variation}$$
$$d_{Variation} = d_{Charted} + \Delta d \cdot \Delta T = d_{Charted} + \Delta d \cdot (2019 - [Year]_{Charted})$$

$$BRG_{True|Charted|Leading\ light} = BRG_{Magnetic} + \Delta_{Magnetic} = BRG_{Gyro} + \Delta_{Gyro}$$

Date/ Time	**Position/ Chart**	$BRG_{True} = BRG_{Charted} = BRG_{Leading\ light}$	BRG_{Gyro}	Δ_{Gyro}	BRG_{Mag}	δ d	$\Delta_{Magnetic}$
24.04.2019 18.27	22° 29.2′*N* 097° 52.1′*W*	270.0° Altamira Leading Lights	271.5°	−1.5° Repeater PS	268.8°	−1.8° +3.0°	+1.2°

DETERMINING COMPASSES' ERRORS BY LANDMARK

$$CSE_{True} = CSE_{Magnetic} + \Delta_{Magnetic} = CSE_{Gyro} + \Delta_{Gyro}$$
$$\Delta_{Magnetic} = \delta_{Deviation} + d_{Variation}$$
$$d_{Variation} = d_{Charted} + \Delta d \cdot \Delta T = d_{Charted} + \Delta d \cdot (2019 - [Year]_{Charted})$$

$$BRG_{True} = BRG_{Magnetic} + \Delta_{Magnetic} = BRG_{Gyro} + \Delta_{Gyro}$$

Meridional parts

$$M = a \cdot \ln 10 \cdot \log\left[\tan\left(45 + \frac{L}{2}\right)\right] - a \cdot (e^2 \cdot \sin L + \frac{e^4}{3} \cdot \sin^3 L + \frac{e^6}{5} \cdot \sin^5 L + \cdots)$$

$$a = \frac{21600}{2\pi}$$

$$e = \sqrt{2f - f^2}$$

$$f = \frac{1}{298.26}$$

$$\tan BRG_{True} = \left|\frac{\Delta\lambda}{\Delta M}\right| = \left|\frac{\lambda_L - \lambda_S}{M_L - M_S}\right|$$

Date/ Time	**Ship's position** φ_S, λ_S	**Landmark position** φ_L, λ_L	M_S M_L	BRG_{True}	BRG_{Gyro}	Δ_{Gyro}	BRG_{Mag} δ d	$\Delta_{Magnetic}$
22.04.2019 20.12 At anchor	22° 25.12′N 097° 46.74′W	22° 29.57′N 097° 51.78′W J 4233 Puerto de Altamira	1372.04 1376.83	313.543°	SB 313.3° PS 315.1°	SB +0.243° PS −1.557°	308.0° +1.5° +4.0°	+5.5°

DETERMINING COMPASS ERROR BY COURSE INDICATORS' COMPARISON (WHEN UNDERWAY ON A STRAIGHT COURSE)

$CSE_{True} = CSE_{Magnetic} + \Delta_{Magnetic} = CSE_{Gyro} + \Delta_{Gyro}$
$\Delta_{Magnetic} = \delta_{Deviation} + d_{Variation}$
$d_{Variation} = d_{Charted} + \Delta d \cdot \Delta T = d_{Charted} + \Delta d \cdot (2019 - [Year]_{Charted})$

$CSE_{True} = CSE_{Gyro} + \Delta_{Gyro}$
$COG = CTS + \alpha_{Leeway} + \beta_{Drift}$
$CTS = HDG = CSE_{True}$

No.	Date/ Time Position/ Chart	CSE_{Mag} δ d	$CSE_{T\|M}$	$CSE_{GPS} = COG$ Leeway Set Drift	α_{Leeway} β_{Drift}	$CSE_{T\|GPS} = CTS = HDG$	CSE_{Gyro}	$\Delta_{Gyro} = CSE_{True} - CSE_{Gyro}$
1	17.04.2019 18.00 22° 34.4′N 088° 16.0′W	251.0° 0.0° −0.5°	250.5°	252.0°	106.4° 26.0 *kn* 215.3° 1.8 *kn*	252.2°	252.0°	+0.2°
2	17.04.2019 18.30	252.0° 0.0° −0.5°	251.5°	253.0°	104.7° 30.4 *kn* 202.8° 1.4 *kn*	251.9°	252.0°	−0.1°
3	17.04.2019 19.00	253.0° 0.0° −0.5°	252.5°	253.0°	100.6° 27.5 *kn* 215.0° 1.0 *kn*	252.7°	252.8°	−0.1°
4	17.04.2019 19.30	251.0° 0.0° −0.5°	250.5°	253.0°	107.4° 30.5 *kn* 240.9° 1.6 *kn*	251.4°	251.3°	+0.1°
5	17.04.2019 20.00	253.0° 0.0° −0.5°	252.5°	253.0°	98.4° 23.8 *kn* 203.0° 2.0 *kn*	252.7°	252.8°	−0.1°
6	17.04.2019 20.30	252.0° 0.0° −0.5°	251.5°	253.0°	108.6° 24.5 *kn* 217.5° 1.0 *kn*	252.2°	252.3°	−0.1°

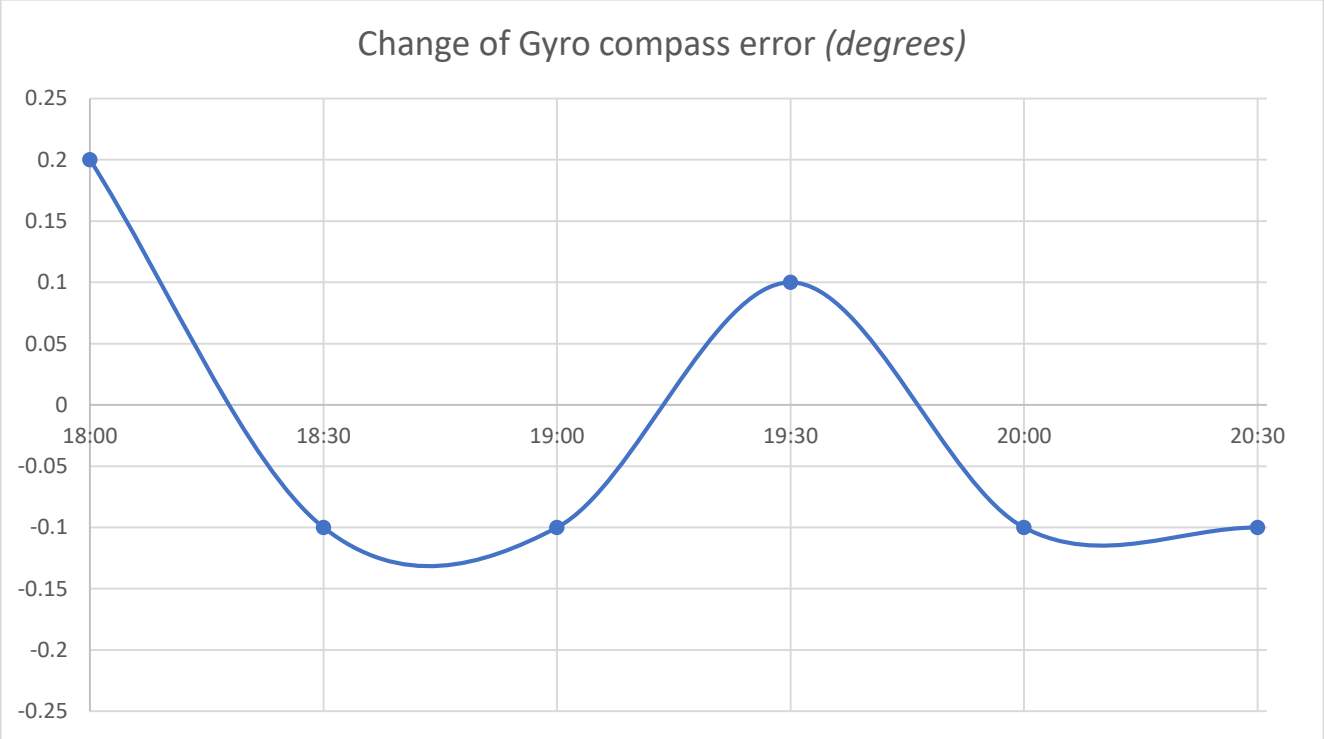


Figure 6.4.1. Change of Gyro compass error [6.4]

6.5 AUTOPILOT

Авторулевой. Тип рулевой машины. Порядок настройки авторулевого. Фото или копия отрезка курсограммы (если есть возможность совместно с углами кладки пера руля) с указанием средних углов кладки пера руля, состояний моря и погоды, скорости судна и его загрузки.

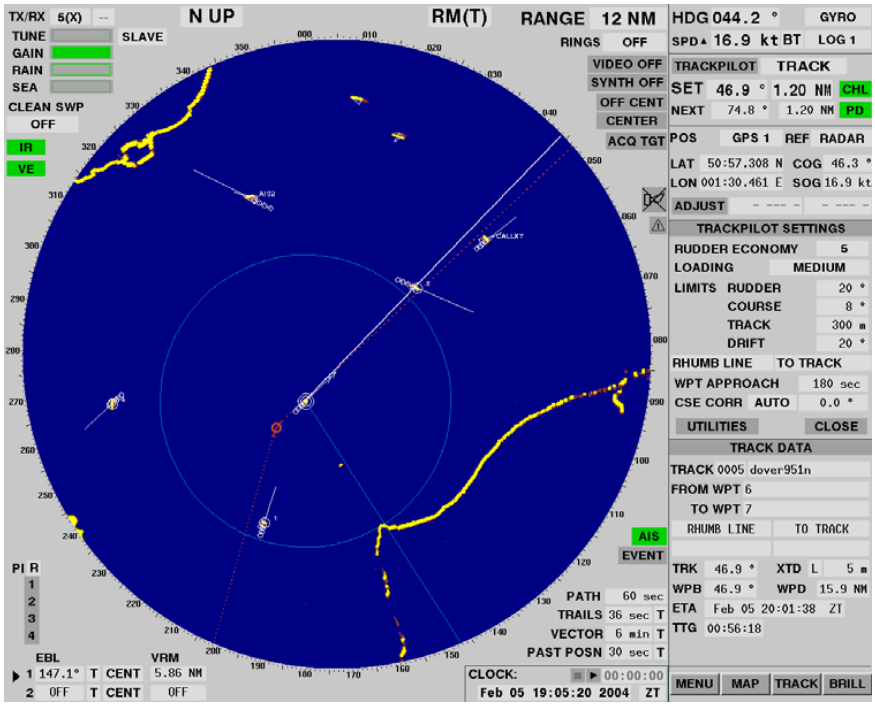


Figure 6.5.1. TRACKPILOT 1100 [6.5]

TECHNICAL DATA

Manufacturers *Производитель*	SAM Electronics GmbH	**Weather Adaptation** *Способ учета метеоусловий*	
Model *Модель АР*	TRACKPILOT 1100	*Состав блока коррекции*	
Modes *Режимы работы*	Heading, Course, Track	*Состав рулевого датчика*	

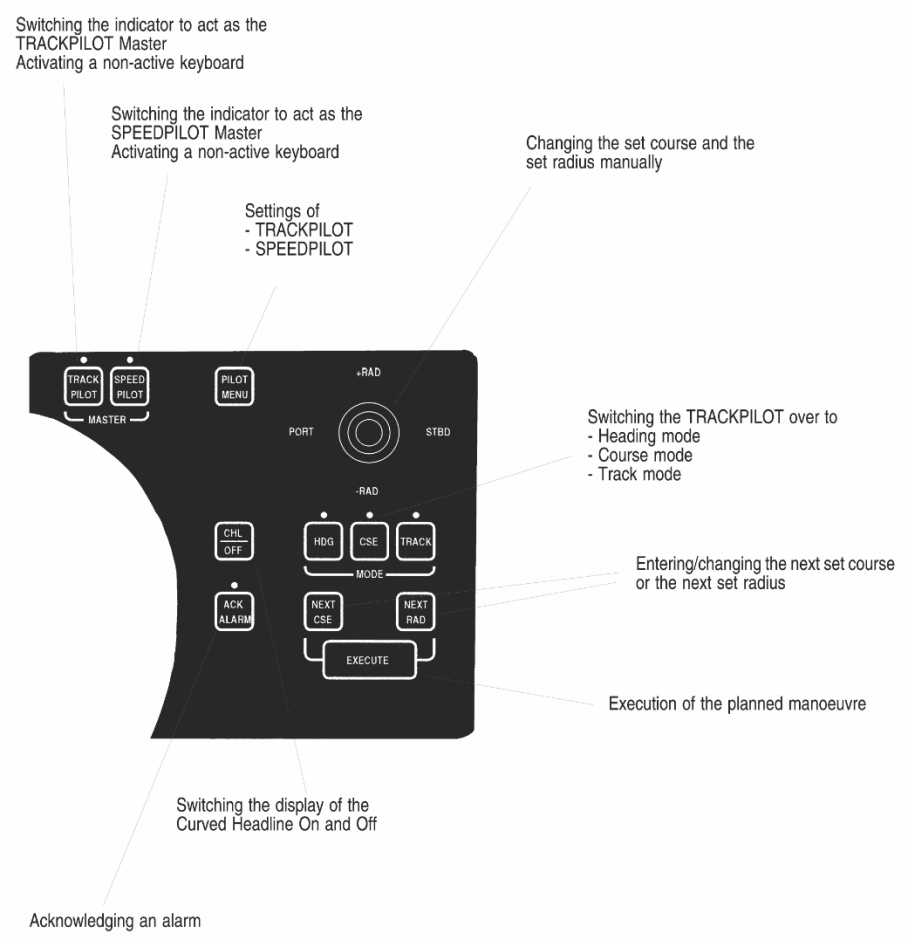
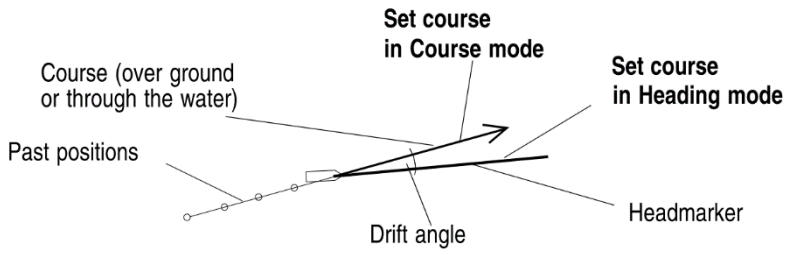
Type *Тип рулевой машины*		*Аварийное управление*	
Adaptations *Тип регулятора авторулевого*	Rudder Economy	**Limits, Alarms** *Виды сигнализации*	Rudder Limit, Course Limit, Track Limit, Drift Limit
Radius Steering *Способ задания циркуляции*	Set radius Joystick (+RAD or –RAD)		

SETTINGS

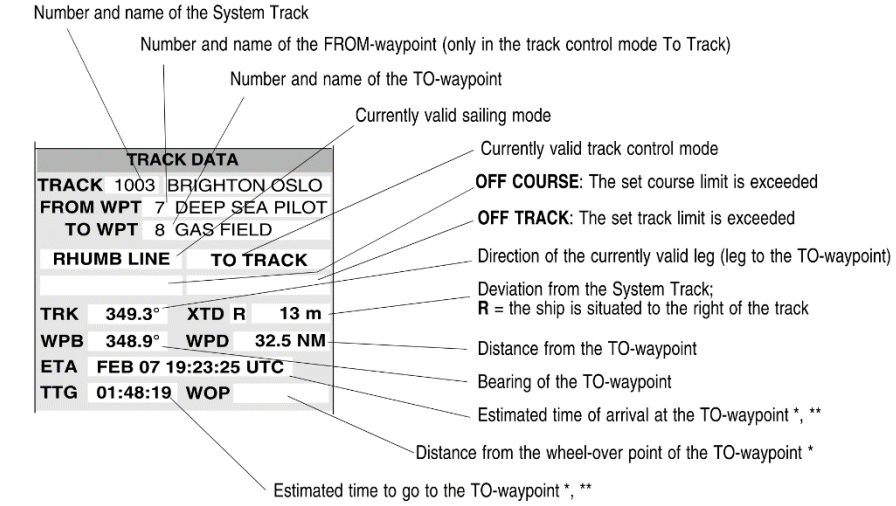
Settings *Настройка автрулевого (пределы регулировки)*	**Rudder** *КОС*	**Counter rudder** *Производная*	**Yawing** *Чувствительность*
Спокойное море 0 – 3 баллов			
Волнение 3 – 5 баллов			
Волнение 5 – 7 баллов			

OPERATING

Operating	**Description**
Functional Integration of the TRACKPILOT	The TRACKPILOT is an autopilot which operates as a track controller, i.e. it steers the ship along a defined path, which is generally called a track. Another basic principle is that of Radius Steering, i.e. course changes are performed with a defined radius. The steering of the ship by means of the TRACKPILOT can take place in the steering modes “Heading mode,” “Course mode” and “Track mode”. Optionally, the ship may be equipped with another operational mode, the “Anchor Control mode”, with which it is possible to maintain the heading during the anchoring procedure. The TRACKPILOT can be operated from all radar indicators that are equipped with a TRACKPILOT keyboard.

The TRACKPILOT Keyboard	The TRACKPILOT keyboard makes it possible to operate the TRACKPILOT and the optional SPEEDPILOT. The functions of the joystick and of the EXECUTE key are available here only. All other functions can be operated either with the keys of the TRACKPILOT keyboard or with the trackball and cursor. 
Heading Mode and Course Mode	In Heading mode and in Course mode, the track is a straight line pointing in the direction of the set course. Course changes are carried out based on the set radius and the new set course.  Difference between Heading Mode and Course Mode: In Heading mode, the ship is steered on the entered course without the drift angle being taken into account, in a manner similar to that of a conventional autopilot. The ship drifts away from the track if there are disturbances such as wind and current. The course corrections that are therefore necessarily have to be performed manually.

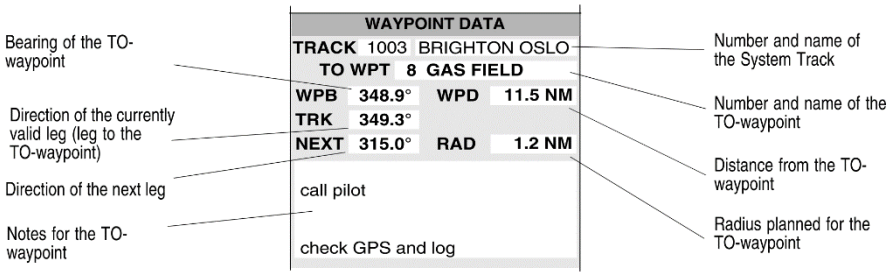
	In Course mode, the ship is kept on the track with the drift component being taken into account. The course over ground is steered (if the necessary sensor information is available to the system). WARNING: In Course mode, the drift component is taken into account only as well as is possible on the basis of the available sensor information.
Track Mode	In Track mode, pre-planned tracks are used. They are defined by waypoints in geographical coordinates and by the radii of the curves along which the ship has to sail when it is changing course. These tracks have to be generated beforehand on a radar indicator or on a CHARTPILOT. With the Pilot Data defined in these tracks, the TRACKPILOT can be automatically parameterised individually for the individual track segments. If the Pilot Data are to be used by the TRACKPILOT, they must be switched on for the TRACKPILOT. This occurs automatically during switch-over to Track mode. One of the pre-planned tracks must be defined as the System Track. Only the data of the System Track are used by the TRACKPILOT. The main difference compared to Heading mode and Course mode is that, in Track mode, inaccuracies in the course data and data are compensated also by use of the position data of the selected position sensor. In Track mode, the absolute accuracy of track-keeping depends on the accuracy of the speed and position data used. Therefore, when steering is being performed in Track mode, selecting the appropriate speed sensor and the quality of determination of position is particularly important. Avoidance manoeuvre: Also, in the case of steering in Track mode, it is possible at any time to change the existing course by operating the joystick, without any need for additional operating actions. During this process, a switch-over to Heading mode takes place automatically. After the avoidance manoeuvre, it is easy to switch back to Track mode, as long as the activation conditions for Track mode are fulfilled.
The TRACK DATA display	This contains the number and name of the System Track and the numbers and names of the FROM-waypoint (FROM WPT, the waypoint passed last) and of the TO-waypoint (TO WPT), as well as the most important currently valid data relating to the System Track calculated by reference to the System Position.



* When the distance from the wheel over point (**WOP**) is displayed, the values of **ETA** and **TTG** refer to that WOP.

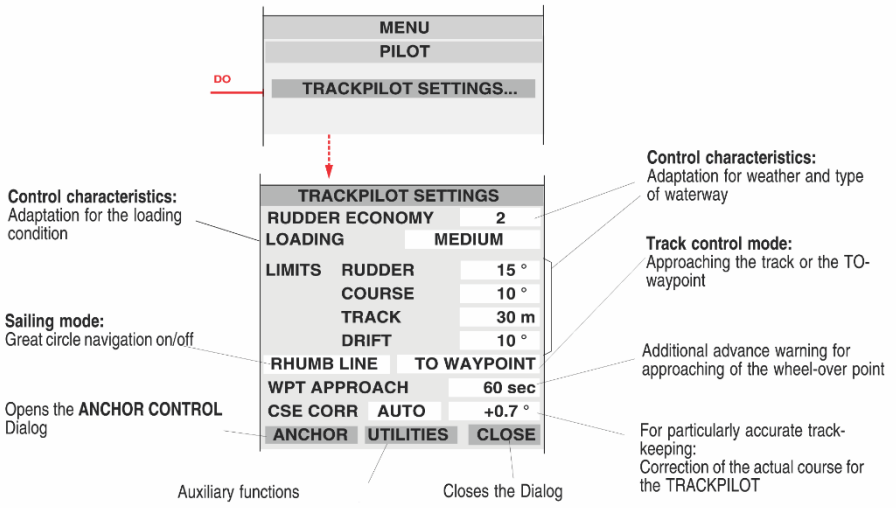
** Assuming that the ship maintains its present speed.

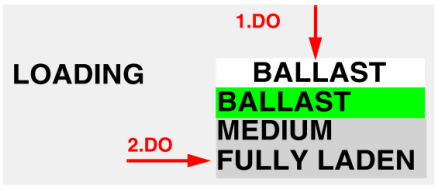
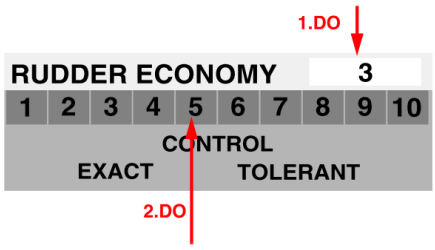
The WAYPOINT DATA Display	This contains information about the TO-waypoint including waypoint notes edited by the operator at the CHARTPILOT.



If the WAYPOINT DATA display is covered over by another display, it can be brought back into the foreground by clicking on the OTHER button and WAYPOINT DATA.

Parameterisation of the TRACKPILOT	The TRACKPILOT has to be adapted for the existing situation by means of parameterisation. These settings are made in the TRACKPILOT SETTINGS Dialog.



	Control Characteristics The control characteristics of the TRACKPILOT were set during the system setting-to-work process in such a way as to suit the characteristics of the ship and of the rudder control system. Additionally, however, during operational use of the TRACKPILOT it also has to be adapted to suit the existing conditions (weather, sea state, loading, necessary track-accuracy) with regard to the following: - Optimisation between precise track-keeping and frequency of changing of the rudder angle, by means of the function RUDDER ECONOMY. - Differing inertia of the ship in different loading conditions, by means of the function LOADING. - Accuracy of track-keeping, by means of the function TRACK LIMIT. - Corrective steering behaviour after deviation from the track, by means of the function COURSE LIMIT. - The maximum compensated drift, by means of the function DRIFT LIMIT. - The maximum permitted rudder angle, by means of the function RUDDER LIMIT. Incorrect setting of these parameters can have the following effects (in all steering modes): - The steering gear works too frequently. - The course sailed fluctuates continuously around the set course (the wake forms a meandering line). - The course accuracy achieved is too low. - When the ship performs corrective steering to return to the set track, it either overshoots the set track or takes too long to reach it. - The deviations from the track are occasionally too large.
Adaptation of the Control Behaviour to Suit the Loading State	Click on the LOADING field and select the function which corresponds to the existing loading state. 
Adaptation to Suit the Weather and the Type of Waterway	Economical Control Behaviour  Economically advantageous optimisation between precise track-keeping and frequency of changing of the rudder angle, depending on sea state and wind, is

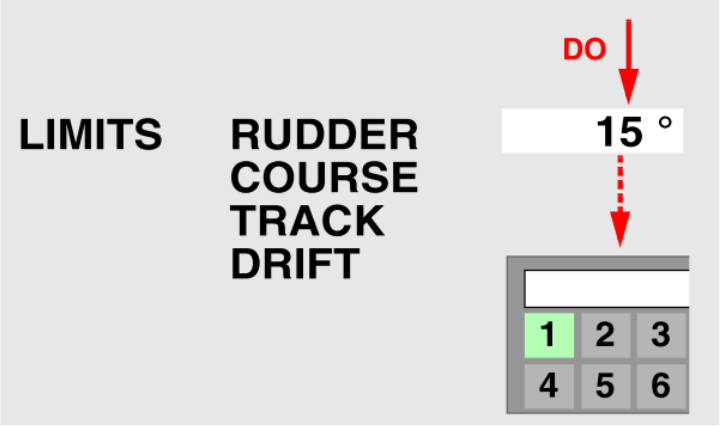
achieved by means of the "rudder economy" parameter. This is comparable to a combination of the control variables "rudder", "counter rudder" and "yaw" of a conventional autopilot.
After clicking on the RUDDER ECONOMY field, the setting is made by clicking on one of the numerical values. A low numerical value corresponds to high values of the control variables "rudder" and "counter rudder", i.e. it leads to less freedom to yaw and to more frequent movements of the rudder.
It is recommended that the adaptation to suit the loading state should be performed before this setting.

Rudder Economy	Steering	Weather
1	Precise	Calm
2 – 3	Precise to tolerant	Normal
4 – 6	Tolerant	Bad
Higher	Very tolerant	Very bad

Limits, Alarms

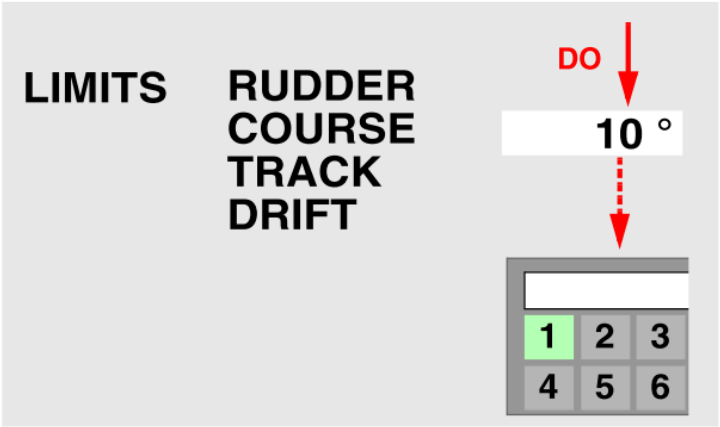
A common feature of the following limits is that, when the set value is reached or exceeded, a corresponding alarm appears.

Rudder Limit



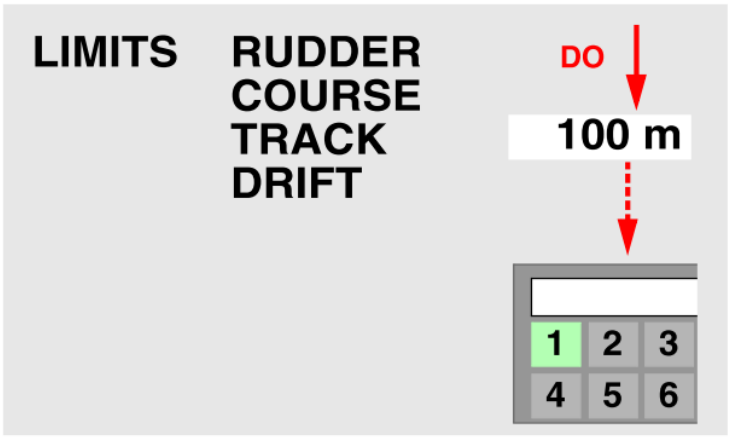
The rudder angle setting which the TRACKPILOT specifies as the maximum value for the rudder control system can be set under LIMITS in the RUDDER field.
The rudder limit value should be reduced if a constant course is to be steered for a long time on the open sea or if, for example because of the loading state or for other reasons, large angles of the rudder are not permitted. In coastal approaches, the rudder limit value must be suitably increased so that the ship can turn with a small radius or can be controlled at low speed.
When the rudder limit value is reached, the TP RUDDER LIMIT alarm appears.

Setting of the Course Monitoring and Limitation of the Corrective Steering Angle (Course Limit)



The numerical value of the course limit is the difference between the actual course and the set course which, if exceeded, causes the TP COURSE LIMIT alarm to appear.
The corrective steering angle, with which the ship is steered back onto the track after deviating from it, is larger for large deviations from the track than for small ones. The corrective steering angle is limited to 50% of the course limit value.
For fast return to the track, a large course limit is necessary. The switch-over to Track mode is possible only if the angle between the System Track and the existing course is less than the course limit. Therefore, for the purpose of switching over to Track mode, it might be desirable to increase the course limit for a short time, or to steer the ship on the System Track.

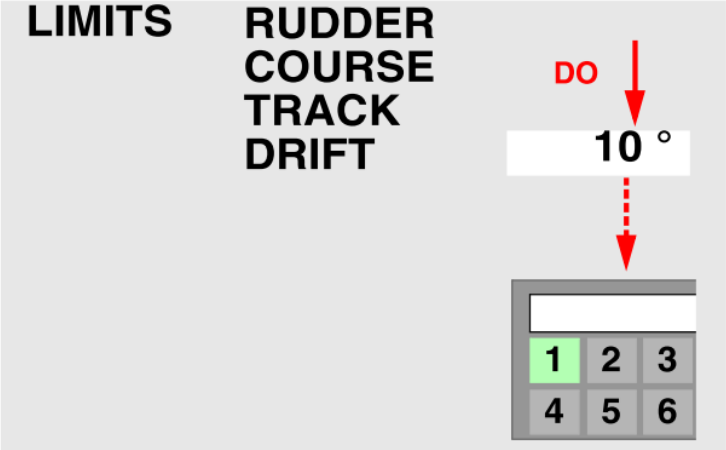
Setting of the Track Monitoring and Adjusting the Track Keeping Precision (Track Limit)



By means of the track limit, the following characteristics are set:
- The TP TRACK LIMIT alarm appears if the deviation of the ship's position from the track reaches the set value of the track limit.

- Switching over to Track mode is possible only if the deviation of the ship's position from the System Track does not exceed the set value of the track limit. For the purpose of switching over to Track mode, it might therefore be desirable to increase the track limit for a short time.
- With a lower track limit, track-keeping is more precise, but the rudder movement frequency (for a given rudder economy setting) might possibly be higher.
- With a higher track limit, the time constant of the position filter is increased. As a result, in cases of unsteady position-data, steady track-keeping can be achieved, but higher off-track errors are tolerated.

Limitation of Drift Control (Drift Limit)



The drift limit defines the drift angle up to which, in Course mode and in Track mode, the drift is taken into account and compensated.
The adjustment is made under LIMITS in the DRIFT field. When disturbances of the selected speed sensor are observed, it is advisable to reduce the drift limit.
If the drift limit value is exceeded, the TP DRIFT LIMIT alarm appears.
It can happen that the ship drifts away from the track at the angle by which the drift exceeds the drift limit value.

6.6 LOG SPEED

Лаг. Принцип работы судового лага. Состояние его работоспособности, дата последнего прохождения мерной линии и действующая поправка лага. Особенности использования лага на судне. Сличения показания лага с показанием приёмоиндикатора СРНС NAVSTAR GPS. Поправка лага и поправка измерителя скорости приёмоиндикатора СРНС NAVSTAR GPS по плаванию судна постоянным курсом за вахту.

Figure 6.6.1. Log speed [6.6]

TECHNICAL DATA

Manufacturers *Производитель*	SAM Electronics GmbH	*Режимы работы лага*	
Model *Модель лага*	EM-Log SAM 4642 SATLOG SLS 4120 UDD (Universal Digital Display) SAM 4900	**Operating frequencies** *Частота индикации скорости*	3.8 MHz and 4.2 MHz or 4 MHz, software controlled

Type *Тип лага*	Electromagnetic sensors	**Data transmission / reception** *Метод преобразования сигнала аналог-цифра*	IEC61162 (NMEA)-messages
Дата последнего прохождения мерной линии		**Acoustic frequency** *Частота счетных импульсов*	~ 4 MHz
Действующая поправка лага		**Calibrations** *Виды коррекции скорости*	Transducer unit calibration Draught calibration Speed depending calibration
Working principle *Принцип измерения скорости*	Acoustic correlation	**Display modes** *Виды индикации скорости*	STW (m/s) STW (kn)
Speed Range *Диапазон измерения скорости*	± 50 knots sensed speed	**Correction** *Метод ввода нелинейной корректуры*	Installation Angle Correction Drift Angle Correction Calibration
Speed Accuracy *Точность измерения скорости*	Better than 1% or 0.1 knots relative to sensed water flow, whichever is the greatest		

SPEED INDICATORS' COMPARISON

$SPD_{Log} = V_{Log|Corrected} = V_{Log} + \Delta V_{Log} = STW$

$SPD_{GPS} = V_{GPS} = SOG$

No.	Date/ Time	V_{Log}	$\Delta V_{Log\ error}$	$V_{Log\|Corrected}$	V_{GPS}	$\Delta V_{Log\ -\ GPS}$
1	22.04.2019 12.25	12.2 *kn*		12.2 *kn*	14.5 *kn*	$\mathbf{-2.3\ kn}$
2	24.04.2019 19.12	11.1 *kn*		11.1 *kn*	11.9 *kn*	$\mathbf{-0.8\ kn}$
3	25.04.2019 12.30	11.3 *kn*		11.3 *kn*	11.8 *kn*	$\mathbf{-0.5\ kn}$
4	26.04.2019 12.05	11.9 *kn*		11.9 *kn*	12.7 *kn*	$\mathbf{-0.8\ kn}$
5	30.04.2019 09.00	10.1 *kn*		10.1 *kn*	17.3 *kn*	$\mathbf{-7.2\ kn}$

6.7 ECHO-SOUNDER

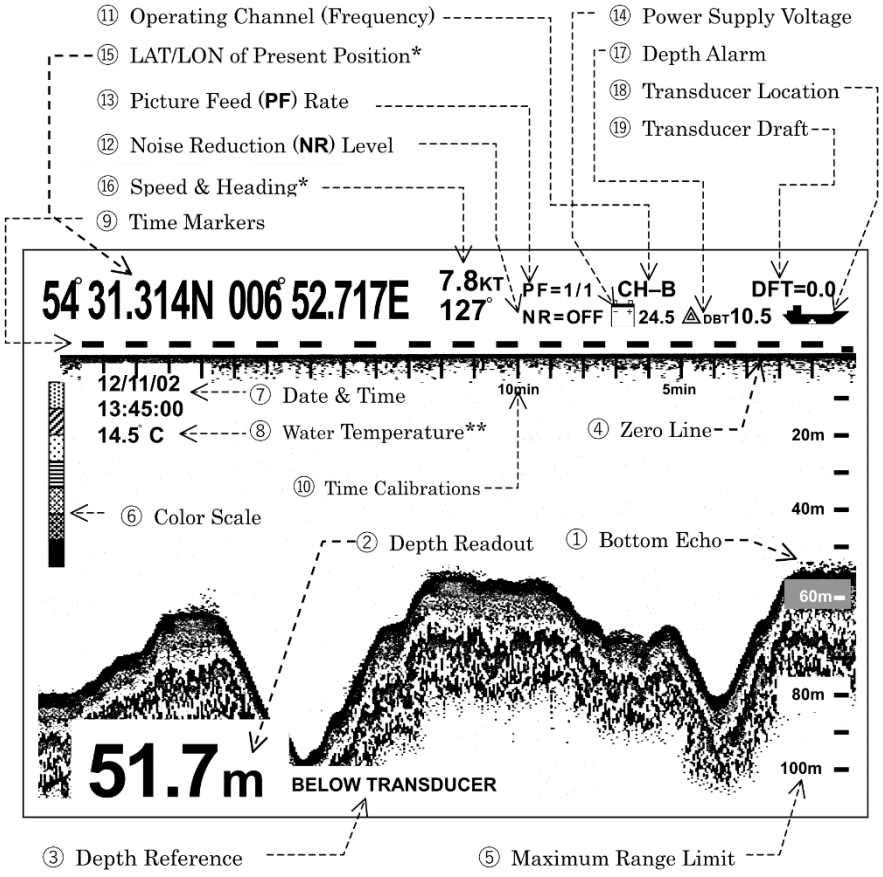
Эхолот. Порядок использования эхолота на судне и способы контроля точности. Зарисовка характерных эхо-грамм для различных грунтов.

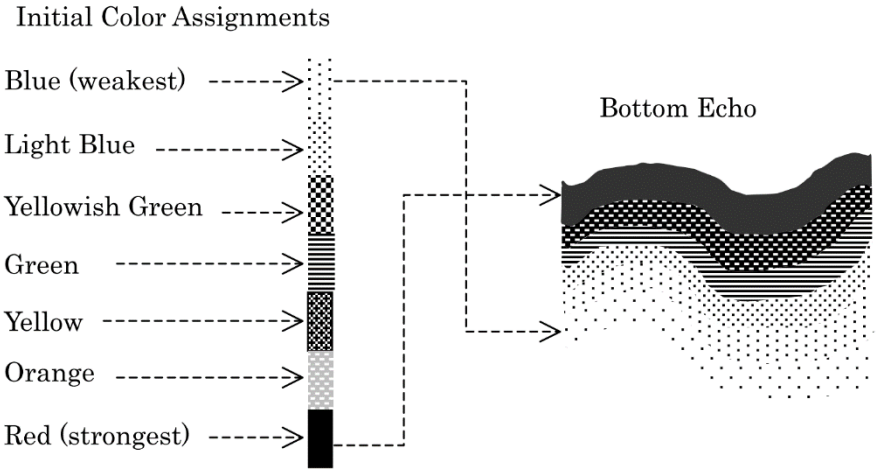
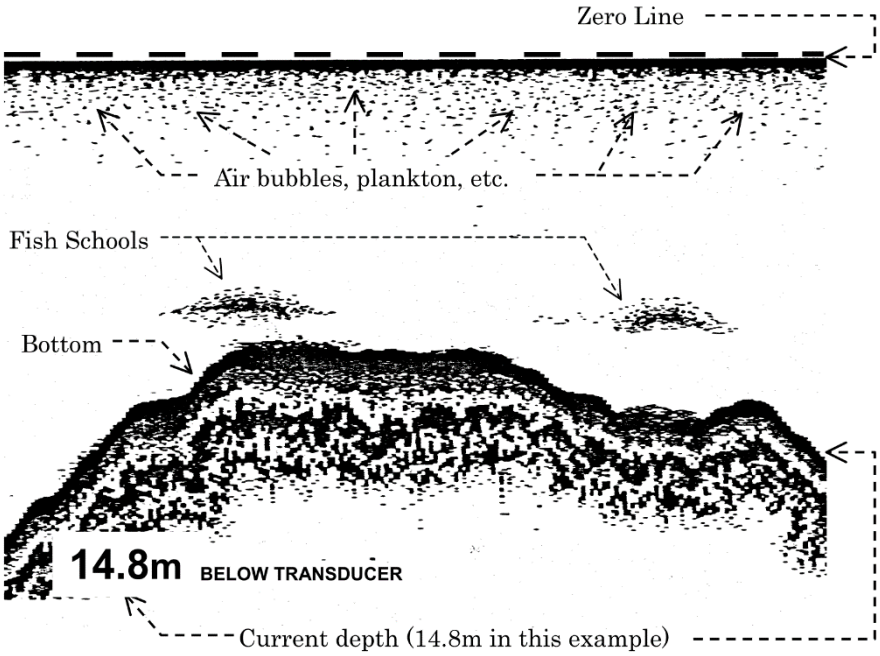
Figure 6.7.1. Echo-sounder [6.7]

TECHNICAL DATA

Manufacturers *Производитель*	SAM Electronics GmbH	**Depth Reference** *Режимы работы эхолота*	Below transducer Below surface Below keel
Model *Модель эхолота*	DEBEG 4630 Navigation Echosounder	**Echogram Presentation** *Вид индикации глубины*	Echoes are displayed in up to 7 analog RGB colors, depending on strength.
Type *Тип эхолота*	Dual frequency navigation echo sounder	**Velocity Standard** *Расчетная скорость рапространения звука в эхолоте*	1500.0 m/s, fixed

Depth Ranges *Диапазон измерения глубины*	5 – 10 – 20 – 40 – 100 – 200 – 400 – 1000 m	**Beam angles** *Угол диаграммы направленности антенны*	Various (4.5°, 7°, 12° 14° – 20°)
Accuracy of Measurement *Точность измерения глубины*	20-meter range: Better than 0.5 m 200-meter range: Better than 5 m Other ranges: Better than 2.5% of digital depth readout	**Transducers** *Количество антенн*	Three transducers
Transducer Frequencies *Частота излучения*	Standard: 100 kHz Option: 50 kHz, 200 kHz	**Gain Controls** *Способ возбуждения антенны*	Receiver gain control TVG (time-varied gain)

Interpreting Navigation Sounder Screen	Typical full screen echogram display  * *Optional GPS sensor required.* ** *Optional temperature sensor required.*
Bottom Echo Colors	The bottom echo will be displayed in up to seven different colors – initially, red, orange, yellow, green, yellowish green, light blue and blue, which represent the various layers of the bottom stratum in order of strength. Namely, red represents

	the strongest level, and blue, the weakest one. A colored bar (termed "color scale" in this manual) located at the left end of the screen indicates the colors that are currently assigned to display echoes. Initial assignments of bottom echo colors 
Other Echoes	In addition to the bottom echo (and its multiple echoes), the equipment will show echoes from fish schools, temperature layers, and various tiny objects, like plankton concentrations and air bubbles. Typical Shallow Water Echo Display 

7 RADIO-NAVIGATIONAL EQUIPMENT

РАДИОНАВИГАЦИОННЫЕ ПРИБОРЫ

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7.1 SAFETY REQUIREMENTS

Техника безопасности

GENERAL SAFETY PRECAUTIONS FOR THE RADAR

Danger	**Precautions**
Faults in the radar display	Particular attention must be paid to the notes and warnings referring to possible faults in the radar display, since such faults can impair the detection of targets. The radar can perform its safety function if, and only if, the transmission power and the receiver sensitivity are adequate. Therefore, these characteristics must be checked regularly (by means of the performance monitor).
High frequency radiation	Persons must definitely avoid being present in the radiation danger zone of the rotating antenna. In the case of work being done on the antenna unit, the antenna switch situated there must be set to 0 and the transceiver must be disconnected from the ship's mains.
Injury caused by a rotating antenna	When the radar system is switched to "ON", it is possible that, instead of the expected antenna, a different one will begin to rotate. Therefore, it must be ensured beforehand that all antennas can rotate freely and that there are no persons near the antennas. The different electronic units and gearboxes may be opened only by qualified, trained persons.
Dangerous voltage	Even when the equipment is switched off, there can be a dangerous voltage present at exposed contacts in the units. Therefore, before a unit is opened, it must be ensured that the voltage supply to the unit is disconnected from the ship's mains, and that it remains disconnected. Because of the capacitors contained in the units, there can be a dangerous voltage present in any unit even several minutes (or several hours in the case of monitors) after switching off and disconnection from the power supply.

GENERAL SAFETY PRECAUTIONS WHEN USING NACOS

Danger	**Precautions**
Non-observance of the safety precautions	The NACOS combines nautical data from the planning stage right up to automatic track control, and displays these data in context at a workplace, usually the radar. This increases the safety of ship-handling and reduces the workload of the bridge personnel. However, the use of NACOS does not release the operator from the obligation to handle the ship in accordance with the rules of good seamanship, i.e. to monitor the course, speed and position of the ship. The operation of the NACOS must be monitored too.
Unnoticed deviation from the planned track	Even when NACOS is being used, non-observance of the safety precautions can lead to unnoticed deviation from the planned track, thus causing danger to shipping. When NACOS is being used, the following points must be observed: 1. NACOS may be used and operated only by qualified personnel who have been trained to operate the system. 2. Operators must continually keep themselves informed about the nautical situation of the ship and about the status of the NACOS. 3. Alarms (visual alarms, acoustic alarms, messages) provide information that is relevant to safety. NACOS alarms relating to nautical situations and to faults in the NACOS and in the sensors and/or actuators connected to it must be observed. When alarms occur, the operator must immediately obtain a clear overview of their causes, the NACOS system status and possible reactions of the system, and – if necessary – must immediately take all of the necessary actions for avoidance of possible danger. Only then alarms may be cancelled. 4. The courses steered by NACOS must be continuously checked by the operator with regard to traffic safety and taking account of the official charts. 5. While a manoeuvre is executed by the TRACKPILOT, special attention is required if the manoeuvre must be altered. 6. Compensation for drift takes place in particular modes only. 7. Position data are dependent on the accuracy and proper functioning of the selected position sensor. 8. Connected position receivers must fulfil the standard IEC 61162-1. 9. Shallow water may affect the dynamics and manoeuvrability of a vessel. For this purpose, shallow water is considered to be a water depth (depth below transducer + draft) of less than 2.5 times the draught of the vessel. It is reminded that extra vigilance should be given to the reaction of own vessel in shallow water. Careful consideration should be given before using the TRACKPILOT in shallow water, especially at higher speeds. If the TRACKPILOT is used in shallow water, as always, attention is to be given to the settings prior to engaging and the performance monitored after.

7.2 RADIO-NAVIGATIONAL EQUIPMENT. SATELLITE NAVIGATION SYSTEMS.

Радионавигационные средства. Приёмоиндикатор РНС или СРНС

7.2.1 OPERATIONAL AND TECHNICAL CHARACTERISTICS

Эксплуатационные и технические характеристики навигационных приборов.

OVERVIEW

No.	Equipment/ System	Overview
1	LORAN-C	**Acronym** LORAN in an acronym for 'LOng RAnge Navigation'. The earliest version (in 1957) was LORAN-A, but this was later superseded by LORAN-C. **Configuration** LORAN-C is a 100 kHz electronic position Fixing system using pulse transmission, covering the North West Atlantic including the Gulf of Mexico, the North Pacific including the South China Sea, North West Europe and the Arabian Sea. A LORAN-C chain consists of a master station and two, three or four slave stations sited around it at distances of about 600-1000 nm. Ground wave cover extends to a range of 800-1200 nm. Sky wave cover extends to 1800 – 2400 nm at night; there is usually some sky wave cover by day. **Levels of Accuracy** Fixing accuracy is better than 0.25 n miles (95%) within the ground wave and may be as good as 0.1 n mile close to the baseline between the stations of a pattern. Fixing accuracy is reduced to about 10-20 n miles (95%) when using the sky wave. **Spheroid / Datum** LORAN-C uses WGS 84. **'Enhanced LORAN' (eLORAN)** Enhanced LORAN (eLORAN) is currently (2008) under development; it includes differential eLORAN corrections in the signal, with positional accuracy <10 metres achieved in trials. Operational systems are unlikely immediately but eLORAN may soon be a possible alternative to GPS in some areas.

2	GPS (NAVSTAR Global Positioning System)	**Acronym** NAVSTAR in an acronym for 'NAVigation Satellite Timing And Ranging'. **GPS Configuration** NAVSTAR GPS is a US Dept of Defence world-wide satellite navigation system providing very accurate continuous position, velocity and time. 24 operational satellites are uniformly distributed in 6 orbital planes, each inclined to the plane of the Equator at 55/, at a height of 20,200 km (10,900 n.miles). This configuration ensures that at least 4 satellites with suitable elevations are 'visible' to a receiver anywhere on the Earth's surface at any time (except in Polar regions where coverage is reduced). **Levels of Accuracy** There are 3 levels of GPS accuracy (PPS, SPS, DGPS). • PPS. Encrypted Precise Positioning Service (PPS) for military users. • SPS. Standard Positioning Service (SPS) for commercial users. Accuracies in the order of 8-13 metres (95%) may be expected with modern receivers. • DGPS. Differential GPS (DGPS) for all users(see Para 0911). Accuracies in the order of 3-4 metres (95%) or better may be expected. **Spheroid and Datum** GPS is referenced to WGS 84. Most modern charts and all WECDIS / ECDIS / ECS equipment are referenced to WGS 84, but if GPS positions are used with older charts referenced to other horizontal Geodetic Datums, a 'Datum Shift' must be applied to GPS (WGS 84) positions before they are plotted. Details of the appropriate Datum Shift are normally found on the chart. **Pseudo Ranging** 'Pseudo Ranging' is used to calculate the geographical position of the GPS receiver, using atomic clocks in the satellites and the propagation time of each satellite transmission. To obtain a two-dimensional Fix, the receiver must obtain a minimum of 3 Pseudo Ranges so that the processor can remove the effects of receiver clock offset error, satellite clock / GPS system time errors and atmospheric propagation delays. A minimum of 4 Pseudo Ranges will give a three-dimensional Fix.
3	DGPS (Differential Global Positioning System)	**DGPS Method** Fixed DGPS base stations determine real-time errors in received GPS Pseudo Ranges for each 'visible' satellite. The corrections are then transmitted directly to DGPS receivers in vehicles in the vicinity (typically within about 1000 km / 540 n miles), normally using selected maritime radio-beacon frequencies to do so. Corrections may also be transmitted by satellite links (e.g. INMARSAT), or in certain areas by Eurofix) using LORAN-C stations. DGPS receivers in receipt of corrections apply them automatically to GPS data before establishing a DGPS Fix. DGPS will only work when the vehicle is within range of the DGPS station and when using the satellites being monitored by that station. **DGPS Accuracy** DGPS accuracies in the order of 3-4 metres (95%) or better may be expected.

4	GLONASS	**Acronym** GLONASS is an acronym for 'GLObal NAvigation Satellite System'. **GLONASS Configuration** GLONASS is operated by the Russian Federation Space Forces and is similar in nature to GPS (see Para 0910), except that WGS 84 is not used. When fully operational (planned for 2009), it will provide a world-wide satellite navigation system giving very accurate continuous position, velocity and time. 24 operational satellites will be uniformly distributed in 3 orbital planes, each inclined to the plane of the Equator at 64.8/, at a height of 19,100 km (10,313 n.miles). This configuration improves Polar region coverage, as compared to GPS. In March 2008, 16 operational satellites were in orbit. GLONASS provides encrypted and non-encrypted services. **Spheroid and Datum** The Spheroid and Datum used by GLONASS is PZ 90, referenced to the Soviet Geocentric Co-ordinate System 1990 (SGS 90). Differences between PZ 90 and WGS 84 are less than 15 m with a mean average of about 5 m.
5	GNSS (GPS, GLONASS)	**Acronym** Global Navigation Satellite Systems (GNSS). GNSS is the generic term for satellite navigation systems that provide autonomous global geo-spatial coverage. **GPS and GLONASS Integrated Use** GLONASS provides advantages for high-Latitude cover (see Para 0913) while GPS favours mid-Latitudes (see Para 0910), thus a receiver able to operate with both systems would offer faster acquisition times, optimum results at all Latitudes and an increased number of 'visible' satellites. Although there are technical complications, dual receiver technology continues to make significant advances and a wide range of products are commercially available.

7.2.2 ERROR TABLE

Методы анализа и выбора средства определения места. Использование таблиц поправок для РНС.

No.	Error source	Typical error (m)	
		GPS	**DGPS**
1	Ionosphere	± 10	± 0.5
2	Troposphere	± 2	± 0.2
3	Orbit errors	± 1	± 0.05
4	Satellite clock	± 1.5	± 0
5	Multipath	± 0.6	± 0.3
6	Receiver	± 0.1	± 0.1
	TOTAL ERROR	**± 10.0 – 15.0**	**± 0.5 – 3.0**

7.2.3 SERVICE INSPECTIONS

Процедуры вызова сервисных специалистов для ремонта радионавигационных средств

No.	Manufacturer	Contact
1	SAM Electronics GmbH	SAM Electronics GmbH D – 22763 Hamburg Service Customer Support Center Telephone: + 49 (0) 18 03 00 85 53 Telefax: + 49 (0) 18 03 00 85 54 E-mail: shipservice@sam-electronics.de
2	Saab TransponderTech AB	Installation, Service and Technical Support Contact R4 Navigation System dealer
3	Shipping Agencies	

7.2.4 LORAN-C RECEIVER

Включение, настройка, определение места, выключение приемоиндикаторов фазовых и импульсно-фазовых систем

Statement of Fact:

Loran-C is no longer operational.

The transmission of Loran-C signals is now permanently discontinued, following the decision to cease transmission by the USA (including the Russian-American chain) and Canada in 2010, the UK and the Europe in 2015.

This should be considered when using volumes of ADMIRALTY Sailing Directions that cover the withdrawn chains.

7.2.5 GPS/ DGPS RECEIVER

Включение, настройка, определение места, выключение приемоиндикаторов ГНСС NAVSTAR и ГЛОНАСС в стандартном и дифференциальном режимах. Порядок настройки и использования в навигационных целях приёмоиндикатора на судне в различных условиях плавания. Способы учёта поправок для перехода на геодезическую основу путевой карты. Абсолютная скорость судна, отображаемая на экране приёмоиндикатора. Приём получения величины магнитного склонения с помощью приёмоиндикатора.

Figure 7.2.5.1. R4 Navigation System [7.2]

TECHNICAL DATA

Feature	**R4 Navigation System**	**DEBEG 4422 / 4428** **GPS / DGPS Navigator Systems**
Manufacturers *Производитель*	SAAB	SAM Electronics GmbH
Model *Модель приемника*	R4	DEBEG 4422 / 4428
Количество каналов		

DGPS *Поддержка диф. режима*	Yes	Yes
Satellite compass *Спутниковый компас*	No	No

GPS VS DGPS

GPS	**DGPS**
The Navstar Global Positioning System, commonly referred to as GPS, is a satellite navigation system developed by the U.S. Department of Defense to provide both military and civilian users with highly accurate, worldwide, three-dimensional navigation and time. By receiving signals from orbiting GPS satellites, authorized users are able to continuously navigate with an accuracy on the order of 16 meters or better, while civilian users are limited to accuracy's of approximately 30 meters 2D RMS.	A technique referred to as Differential GPS (DGPS), allows users to obtain maximum accuracy from the GPS system. DGPS requires the use of two GPS receivers. One receiver, known as the Reference Station, is placed at a surveyed location, the coordinates of which are precisely known. The purpose of the differential GPS system is to use the reference station to measure the errors in the GPS signals and to compute corrections to remove the errors. The corrections are then communicated in real-time to the navigators, where they are combined with the satellite signals received by the navigators, thereby improving their navigation or positioning. The geographic validity of these corrections decreases with distance from the reference station, but the corrections are valid for navigators hundreds of kilometers from the reference station. Marine radio beacons operating in the 283.5 to 325.0 kHz frequency range are in widespread use for direction finding in coastal navigation. Because the beacon system has been in place and widely used for many years, it provides an effective means for the transmission of DGPS signals. Depending on their local environment and power output, their signals may be usable to several hundred miles. Marine beacons provide an economical means of obtaining DGPS accuracy for coastal navigators. GPS receivers with built-in beacon receivers are designed to provide low cost reception of DGPS corrections broadcast (normally free of charge) by coastal authorities.

FRONT PANEL KEYS

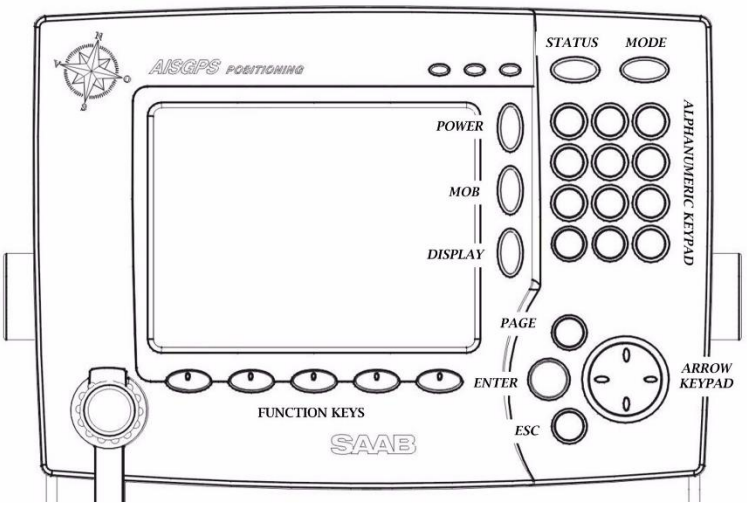


Figure 7.2.5.2. Front panel [7.2]

Key	**Function**
POWER	Used for turning the R4 Display on and off. To turn the power off press and hold the key for 3 seconds.
MOB	Used to mark the spot of an event or when a person has fallen overboard. To mark an event, press the key momentarily. To activate the Man Over Board (MOB) function, press the key for at least 5 seconds.
DISPLAY	Provides controls for fast configuration of backlight, contrast, LED illumination and button illumination. Two separate configurations are available, for day and night operation.
STATUS	Not used in a R4 Navigation System.
MODE	Used for changing mode of operation, which can be set to any of Navigate, Plan Voyage, Alarms & Msgs and Config.
ALPHANUMERIC KEYS	These keys are used for entering text and numbers. To write a number in a numeric field press the key once. To write a character in a text field press once for the first character associated with the key, twice for the second character and so on.
PAGE	Retrieves function keys for fast access of the main views of the current mode.
ENTER	Used to start editing a field and for confirming data entry. Also used to view or edit a highlighted route, leg or waypoint.
ESC	Returns display to previous page or restores a data field's previous value.
∧ ∨ (Up and down on ARROW KEYPAD)	Moves the field and list highlight up and down, and the cursor position when editing a field.

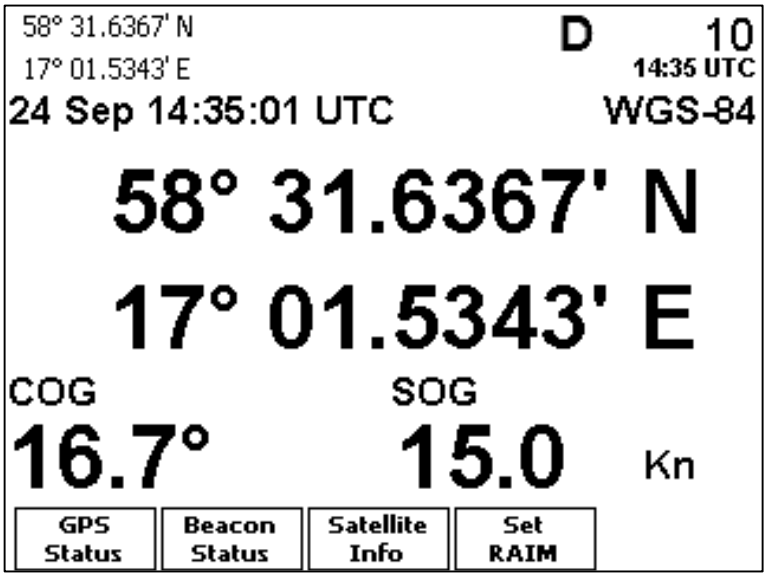
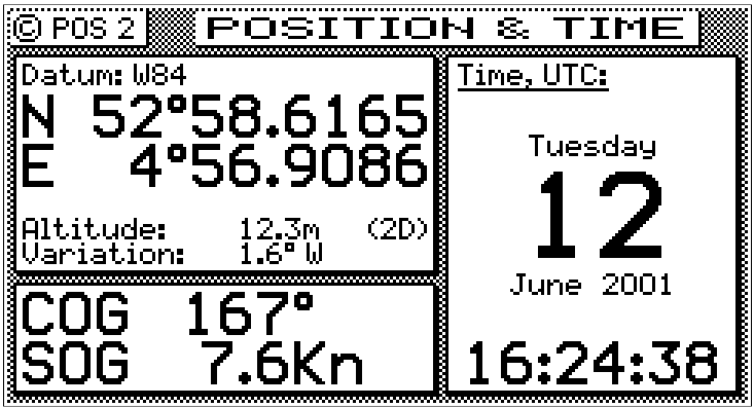
< > (Left and right on ARROW KEYPAD)	Jumps between pages in lists, moves the field highlight left and right and moves the cursor position when editing a field.
FUNCTION KEYS	These keys have different functions depending on current view. The function is displayed above each key on the screen.

GEODETIC DATUM SHIFTS

Datum Shifts	**Formulas**
WGS 84 – Other horizontal Geodetic Datums	$\Delta\varphi = K_1 \cdot \sin 2\varphi + K_2 \cdot \sin\varphi \cdot \cos\lambda + K_3 \cdot \sin\varphi \cdot \sin\lambda + K_4 \cdot \cos\varphi$ $\Delta\lambda = K_2 \cdot \frac{\sin\lambda}{\cos\varphi} - K_3 \cdot \frac{\cos\lambda}{\cos\varphi}$ where: $\Delta\varphi$ – Latitude shift $\Delta\lambda$ – Longitude shift φ, λ – Central coordinate of the chart K_1, K_2, K_3, K_4 – Coefficients tabulated for each geodetic datum $\varphi_{Chart} = \varphi_{WGS\,84} + \Delta\varphi$ $\lambda_{Chart} = \lambda_{WGS\,84} + \Delta\lambda$
WGS 84 – WGS 72	$\Delta\varphi = K_1 \cdot \sin 2\varphi + K_2 \cdot \sin\varphi \cdot \cos\lambda + K_3 \cdot \sin\varphi \cdot \sin\lambda + K_4 \cdot \cos\varphi$ $\Delta\lambda = K_2 \cdot \frac{\sin\lambda}{\cos\varphi} - K_3 \cdot \frac{\cos\lambda}{\cos\varphi}$ where: $K_1 = -0.006, K_2 = 0, K_3 = 0, K_4 = -0.146$ $\varphi_{WGS\,72} = \varphi_{WGS\,84} + \Delta\varphi$ $\lambda_{WGS\,72} = \lambda_{WGS\,84} + \Delta\lambda = \lambda_{WGS\,84} + (-0.55'')$

POSITION. COG AND SOG. MAGNETIC VARIATION.

SAAB R4 Navigation System	The R4 Display will power up in the Position view. The view shows current position, speed over ground (SOG) and course over ground (COG) as reported by the R4 Navigation Sensor. If no position information is available from the R4 Navigation Sensor, this view shows the last available values and the time they were acquired.

	The view is present in Navigate mode, accessed by pressing MODE followed by the function key NAVIGATE. The view is then accessed by pressing function key Position. 
SAM Electronics GmbH DEBEG 4422 / 4428 GPS / DGPS Navigator Systems	POS2 – Position, Altitude, Magnetic Variation, & Time This screen is divided into three windows. The upper left window provides the position coordinates, the antenna altitude (above Mean Sea Level – MSL), altitude mode (2D or 3D), the magnetic variation (Variation) for the present position, and the present datum in use for calculating position. The lower left window displays own course and speed over ground. If the degree symbol has a small 'c' under it, this indicates that the magnetic variation and compass deviation table are being calculated and displayed. The right hand window indicates today's date and time. It can be set for UTC time, local 12 hour time, or local 24 hour time. There is an added summer/winter feature to help remember which direction to set the clock for day light savings in the summer. 

7.3 RADAR

Использование радиолокатора для обеспечения безопасности мореплавания. Знание фундаментальных основ радиолокации.

7.3.1 OPERATING AND SETTING

Включение, основные проверки и регулировки, настройка индикатора, проверка работоспособности

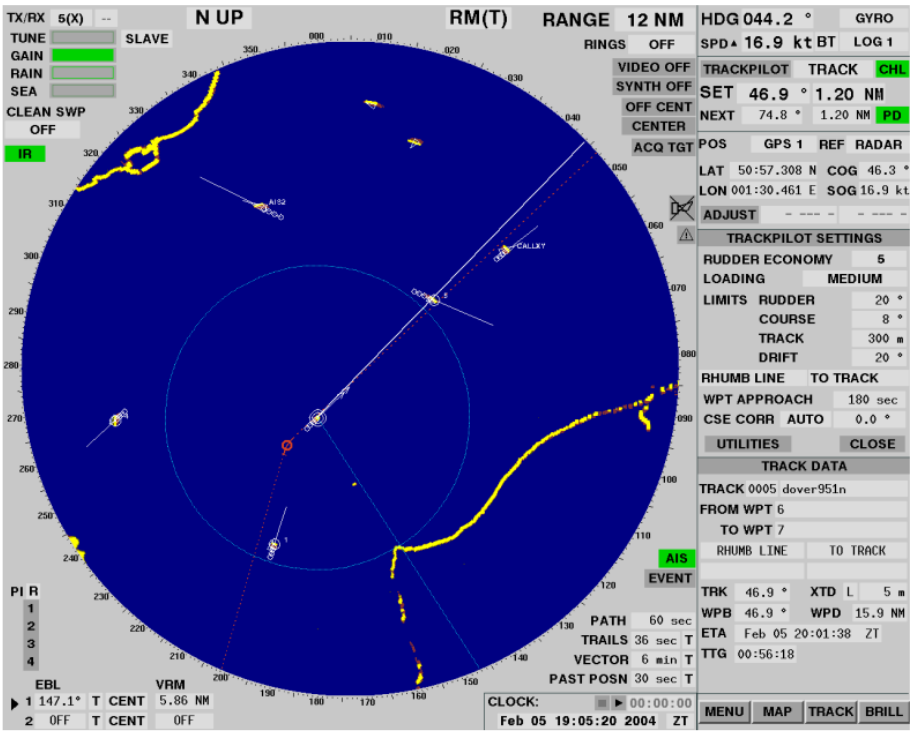
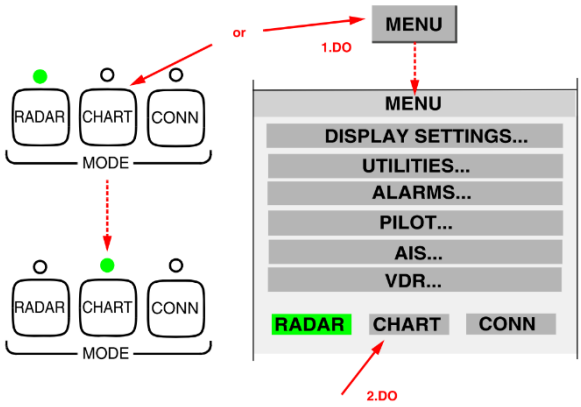
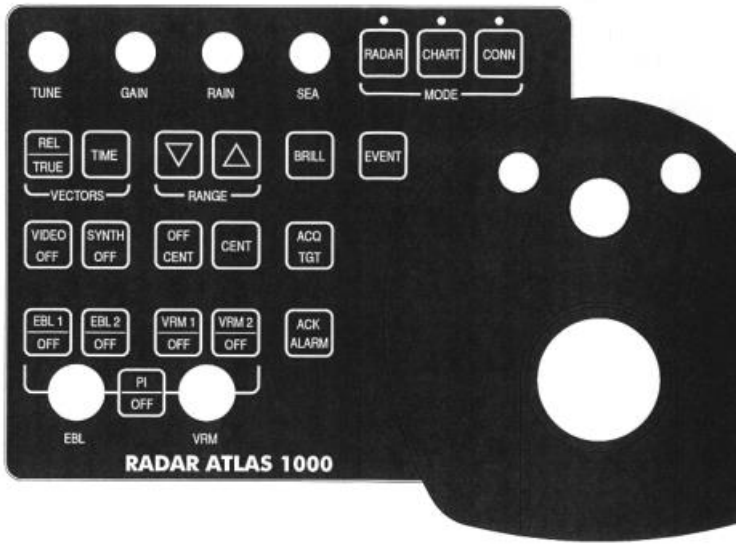
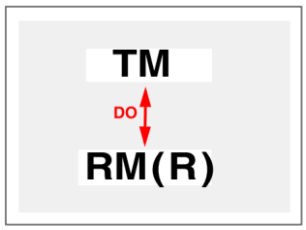
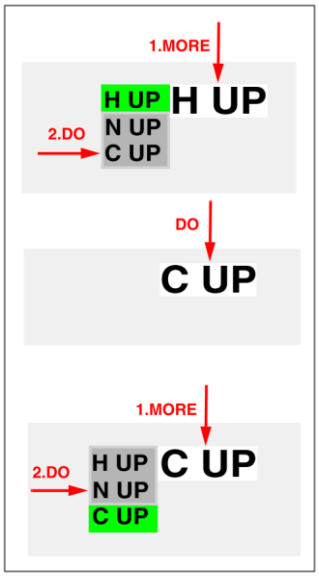


Figure 7.3.1.1. MULTIPILOT 1100 [7.3]

Operating/ Setting	Description
Switching the MULTIPILOT and the Radar System On and Off	Switching the radar system ON is done by means of the ON/OFF switch or POWER keys situated on one of the monitors of the radar indicators or of the CONNINGPILOT. When this is done, all radar indicators and transceivers are switched on. At the same time, the TRACKPILOT too and, if present, the SPEEDPILOT are switched on. After the warm-up phase of the magnetron – 3 minutes for X-Band and 3.5 minutes for S-Band – standby operation is achieved, and the radar function can be switched on.

	Switching the radar system OFF: Switch off all radar indicators and the CONNINGPILOT by means of the ON/OFF switch. As long as there is one of the switches in the ON state, all electronics units of the indicators and transceivers remain switched on and so also do the TRACKPILOT and the SPEEDPILOT Engine Interface.
Stand-By Operation	The main difference between stand-by operation and radar operation is that, during stand-by operation, the transceiver is not transmitting, and the antenna is not rotating. Therefore, the radar video is absent on the PPI, and none of the functions that depend on the transceiver can be operated yet. During stand-by operation, the magnetron is kept at its operational temperature.
Display Modes	 On the MULTIPILOT, it is possible to choose between the following display modes: Radar mode PPI with all radar, ARPA and AIS functions. The chart display modes - Chart Radar mode: PPI with all radar, ARPA and AIS functions. Together with the radar video, a vector chart including the User Chart Objects (instead of the map) is displayed. The colours on the PPI depends on the rules for chart radar systems (bright video on dark areas). The Chart Radar mode of the MULTIPILOT 1100 corresponds to the Chart mode of the CHARTRADAR 1100. - ECDIS mode: Display of the electronic chart (including the User Chart Objects) in accordance with the rules for the ECDIS display. The chart area is rectangular, and in addition the radar video is displayed at the place where the PPI is situated in Chart Radar mode but can be switched off. Colours in accordance with the ECDIS rules (green video). Radar, ARPA and AIS functions are also available, but limited to the PPI area (i.e. the circular area inside the bearing scale). Conning mode Various conning displays with the most important ship-control data.

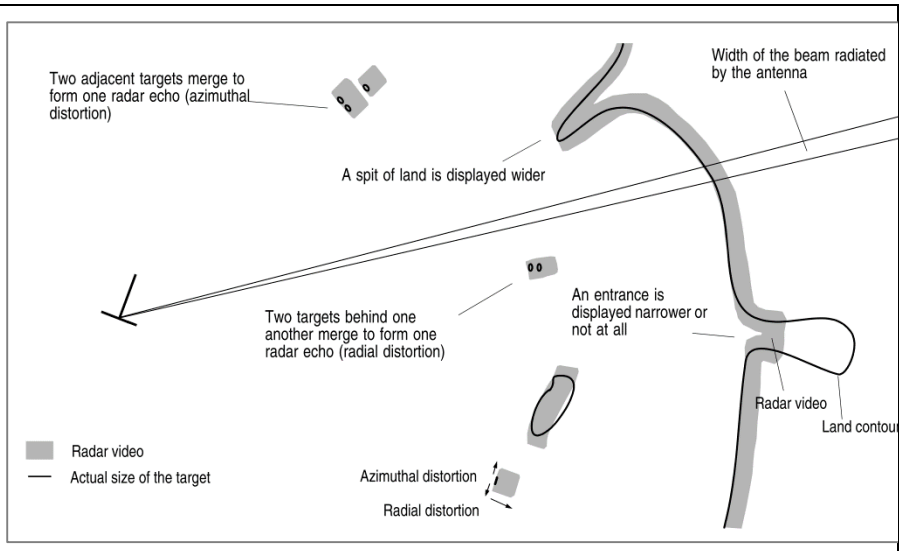
	Operating procedures of the TRACKPILOT (and, if applicable, of the SPEEDPILOT) are possible in all display modes.
	 TUNE / GAIN / RAIN / SEA – Setting the radar video MODE (RADAR / CHART / CONN) – Switching over the display modes, Activating a non-active keyboard VECTORS (REL | TRUE / TIME) – Setting the vectors of targets and own ship RANGE (▽ / △) – Range/scale selection BRILL – Setting of brilliance, colour, keyboard illumination EVENT – Printing out the screen content, Setting and deleting event markers, Setting and deleting position fixes VIDEO OFF / SYNTH OFF – Suppression of the video or synthetics CENT / OFF CENT – Centering/off-centering the display ACQ TGT – Manual target acquisition EBL 1 | OFF / EBL 2 | OFF / EBL – Operating electronic bearing lines VRM 1 | OFF / VRM 2 | OFF / VRM – Operating variable range markers PI | OFF – Operating parallel indexes ACK ALARM – Acknowledging an alarm
Screen Stabilisation: True Motion, Relative Motion	 As far as the screen stabilisation is concerned, there is a choice between the following: True Motion (TM) The radar video is fixed; the own ship symbol moves across the screen. The PPI/ chart area orientation is North-Up or Course-Up. Either manually, or automatically by means of a TM reset, the own ship symbol on the PPI is reset in good time before the PPI boundary is reached. This resetting is done in such a way that the larger part of the PPI lies ahead of own ship.

	Relative Motion (RM) Own ship's position is fixed; the radar video moves relative to own ship in accordance with the movement of own ship. As far as the PPI/chart area orientation is concerned, it is possible to choose between Head-Up, North-Up and Course-Up. If the PPI/chart area orientation setting is Head-Up, then when switchover to TM mode takes place there is automatic selection of North-Up and setting of the display of trails to "true". In TM mode, relative trails cannot be displayed. In RM mode, there is also an indication in the stabilisation field stating whether the trails and vectors are displayed as relative RM (R) or true RM (T).
PPI Orientation: Head-Up, North-Up, Course-Up	 As far as the PPI/chart area orientation is concerned, there is choice between the following: Head-Up: The heading of own ship points upwards. Head-Up is available only in RM mode. North-Up: Geographic north points upwards. Course-Up: The course which exists at the instant of switch-on or re-orientation of this mode points upwards. With every switch-over and re-orientation, the trails are lost; they build up anew in the new mode.

7.3.2 FACTORS AFFECTING RADAR DETECTION CAPABILITY

Факторы, влияющие на обнаружение и точность

No.	Factor	Effect
1	Achievable Radar Range	The theoretically achievable radar range limited by the curvature of the earth depends on the height of the antenna above the water surface and the height of the target and is applicable under normal atmospheric conditions. Whether radar targets can be detected up to this theoretical range, even with optimum video setting, depends not only on the atmospheric conditions but also on the characteristics of the target: - Large targets with good reflection characteristics produce strong echo signals and are displayed with corresponding clarity on the screen. - Smaller targets situated in the shadow of large objects are not illuminated by the radar pulses and are therefore not displayed. - Flat coasts have an unfavourable reflection cross-section and cannot be recognized until they have been approached more closely. On the other hand, high coastlines and mountainous regions further inland are recognised at a very early stage. - In the coastal approaches, the tide rip lines and surf areas are displayed similarly to coastlines. However, this rather irritating display can be a valuable orientation aid for the coastal navigator. - The reflections of radar waves from ice depend largely on the surface structure of the areas illuminated by the radar. Rough and jagged surfaces produce good echo displays, whereas smoothly frozen-over surfaces, rounded surfaces and surfaces at an oblique angle generally reflect the transmitted pulses away from the ship. Thus, for example, the echo display of large icebergs can fluctuate extremely severely, depending on the existing aspect. - The detection of low-lying blocks of ice (growlers) probably presents the greatest uncertainty. Even if the anticlutter facilities are operated carefully, the echoes from growlers can no longer be definitely identified if moderate disturbances from the sea surface are present.
2	Distortions of the Radar Video	Because of the physical characteristics of the radar principle used, the video displayed does not correspond exactly to the position and form of the reflecting target. A distinction must be drawn between radial distortions (in the direction of the target) and azimuthal distortions (perpendicular to the target direction).

		
3	Influences of Meteorological Processes	The influence of meteorological phenomena such as fog, rain, snow or hail on the radar video increases with the size of the droplets in relation to the radar wavelength, and with the density of the droplets. The shorter-wave X-Band radar (with a wavelength of 3 cm) is therefore generally impaired more severely by meteorological influences than is the longer-wave S-Band radar (10 cm wavelength).
4	Reflections from the Sea Surface	Clutter echoes from the surface of the sea can be recognised from the fact that a mostly circular but eccentric area displaced in the wind direction and having non-uniform brightness is formed around the own ship symbol (sea clutter). These echoes make targets in this region more difficult to detect and track, but they have no effect on the display of targets situated behind the reflection zone.
5	Disturbances Caused by Other Radars	Transmissions from other radars working in the same electrical frequency band occur as disturbances in the form of small points or dashes. These move in rapid succession along straight or curved tracks to the centre of the screen or in the opposite direction.
6	False or Indirect Echo Displays	False or indirect echo displays (“ghost echoes”) occur as a result of reflection of the radar pulses by the ship’s own superstructures of all kinds and by nearby objects that reflect very well. Therefore, a typical feature of these echoes is that they appear at the bearing of the reflecting surface, regardless of the real position of the targets.
7	Sectors of Reduced Radar Visibility	Sectors of reduced radar visibility occur as a result of own ship’s superstructures which impair and prevent rectilinear propagation of the radar pulses. Theoretical determination of the geometry of these sectors and of their influence on the display of targets is possible to an inadequate extent only. An effective practical method consists of determining the shadow sectors against the background of disturbance signals from the sea surface (sea clutter).
8	Super-refraction – Sub-refraction	If the normal refraction gradient for the radar wave in the maritime boundary layer of the atmosphere is changed by external influences, subrefraction occurs when the transmitted beam is bent upwards away from the earth’s surface, and superrefraction occurs when the transmitted beam is bent down towards the earth’s surface.

		In the case of superrefraction, false echoes of targets outside the set range of measurement can occur: the echo of a transmitted pulse is not received within the set range but during the next transmit cycle or by the one after that. The resulting ghost echoes can occur at any position. Since the position of ghost echoes depends on the pulse repetition frequency, ghost echoes can be recognised as such by switching over the pulse length or the range on the master radar.

7.3.3 NAVIGATIONAL LANDMARKS, OBJECTS AND TARGETS

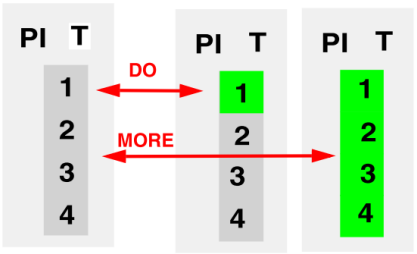
Опознавание навигационных ориентиров, определение места. Обнаружение целей, ложные эхосигналы, сигналы радиолокационных транспондеров, используемых при поиске и спасании, а также неправильные показания.

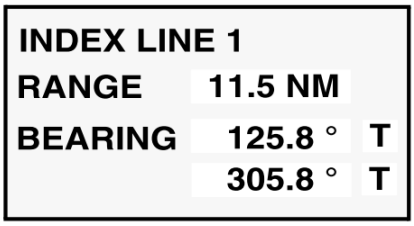
No.	Landmarks/ Objects/ Targets	Description
1	Reflection from Objects	Metal and water are better reflectors of radar than are wood, stone, sand or earth, but the shape and size of an object usually have the greatest effect on its echoing properties. A larger object may have a more extensive but not necessarily stronger echo than a smaller object. The object shape dictates whether or not the reflected energy is concentrated into a beam directed back towards the radar. Flat Reflecting Surfaces A plane surface may produce a strong echo when at right angles to the radar wave but a very weak echo when at fine angles. Curved Reflecting Surfaces Curved surfaces tend to scatter the radar energy and thus produce a poor echo (e.g. conical shaped lighthouses and buoys).
2	Unwanted Echoes	Unwanted side lobe echoes, double echoes from contacts at close range, false echoes from obstructions and also multiple '2nd or 3rd Trace Echoes' are normally easy to recognise: Side Lobes Side lobe echoes are usually symmetrical with unusual shapes. Double Echoes Double echoes from close range contacts and false echoes may be identified by their precisely doubled range on the same bearing. Multiple '2nd and 3rd Trace Echoes' '2nd and 3rd Trace Echoes' have distorted shapes and lack any appropriate visual contacts on the same bearing.
3	Radar Transponders	A radar Transponder may be fitted to small units (e.g. helicopters or survival craft) to enhance the size of their radar echoes. A Transponder consists of a separate radio frequency transmitter

		triggered by the arrival of a radar transmission. The nature of the reply can be varied; one variation is 'echo enhancement', in which the transponder responds with an enhanced pulse coincident with the radar echo, so providing a much-improved echo signal. Alternatively, coded responses may be transmitted by the Transponder in order to aid identification of specific units.
4	Search and Rescue Transponders (SARTs)	When activated in a distress situation, a Search And Rescue Transponder (SART) generates a characteristic 12-blip code on the display of any 3 cm (I / X band) navigational radar transmitting in the area. SARTs may be permanently installed on a vessel / survival craft, or be portable or free-floating; they may also be incorporated into a float-free satellite Emergency Position Indicating Radio Beacon (EPIRB).
5	Radar Beacons – Racons and Ramarks	Racons A Racon is a radar Transponder beacon which emits a characteristic signal when triggered by emissions of ships' radars; SARTs (see Para 1518e) are a specialised form of Transponder beacon for distress situations. Most Racon Transponders sweep the frequency range of the marine radar band. Ramarks A Ramark is a radar beacon which transmits independently, without having to be triggered by the emissions of ships' radars. It is otherwise similar to a Racon, except that the Ramark Flash gives no indication of range, as it extends from the ship's position to the circumference of the display.

7.3.4 PARALLEL INDEX LINES

Использование параллельных индексов в относительном и истинном движении

Operating/ Setting	**Description**
Switching Parallel Index Lines On and Off	 The parallel index lines can be switched on and off individually by clicking on their number displayed below PI but also together in one step by using the more function.

Resetting all PIs	The parallel index lines can be reset to default setting. Click on PI and in the more context menu on RESET.
Changing the Distance of a Parallel Index Line	Click on the parallel index line near the closest point of approach to own ship, drag it to the desired distance, and click again.
Changing the Bearing of a Parallel Index Line	Click on the parallel index line near the compass rose, drag it into the desired direction, and click it again.
Displaying Values of a Parallel Index Line	 While the parallel index line is being operated on the PPI, its data appear in an separate display.
Switching the Bearing Display of the Parallel Index Lines to Relative or True	 The display of the bearings of the parallel index lines can be switched over between true bearing (indicated by T) and relative bearing (indicated by R). The switch-over is performed by clicking on the indication T or R. If the compass signal fails, the display is automatically switched to relative bearing (R).

7.3.5 TARGET DATA. DANGEROUS TARGET.

Выбор целей, с которыми существует опасность столкновения или чрезмерного сближения в истинном и относительном движении, определение дистанции расхождения. Обнаружение изменений курсов и скоростей целей, определение курсов (ракурсов).

TARGET DATA

TARGET DATA			
ID	FGIHG	13	
BRG	57.9	21.1	°
RNG	2.01	3.50	NM
T CSE	217.6	190.0	°
T SPD	21.1	19.8	kn
TCPA	4:29	14:20	min
CPA	0.13	1.78	NM
BCT	4:09	6:34	min
BCR	0.20	0.46	NM

Figure 7.3.5.1. Target Data Display [7.3]

No.	Data	Description
1	ID (Identifier)	The target ID
2	BRG (Bearing)	The bearing of the target
3	RNG (Range)	The range of the target
4	CSE (Course)	With prefix T (True): course over ground / through the water With prefix R (Relative): course relative to own ship
5	SPD (Speed)	With prefix T (True): speed over ground / through the water With prefix R (Relative): speed relative to own ship
6	TCPA (Time to CPA)	The time up until the closest point of approach
7	CPA (Closest point of approach)	The distance at the closest point of approach
8	BCT (Bow crossing time)	The time that will pass before the target crosses the heading line of own ship
9	BCR (Bow crossing range)	The range of the point on own ship's heading line at which the target will cross that line. Negative value: Target crosses the stern line behind own ship.

DANGEROUS TARGET

Dangerous target	ARPA symbol	AIS symbol
Target which has triggered the DANGEROUS TARGET (n) alarm	*(Flashing red)*	*(Flashing red)*

7.3.6 MANEUVERING BOARD. EBL AND VRM.

Ручная радиолокационная прокладка, использование зеркального планшета, электронной прокладки и использование приставок к РЛС

MANEUVERING BOARD

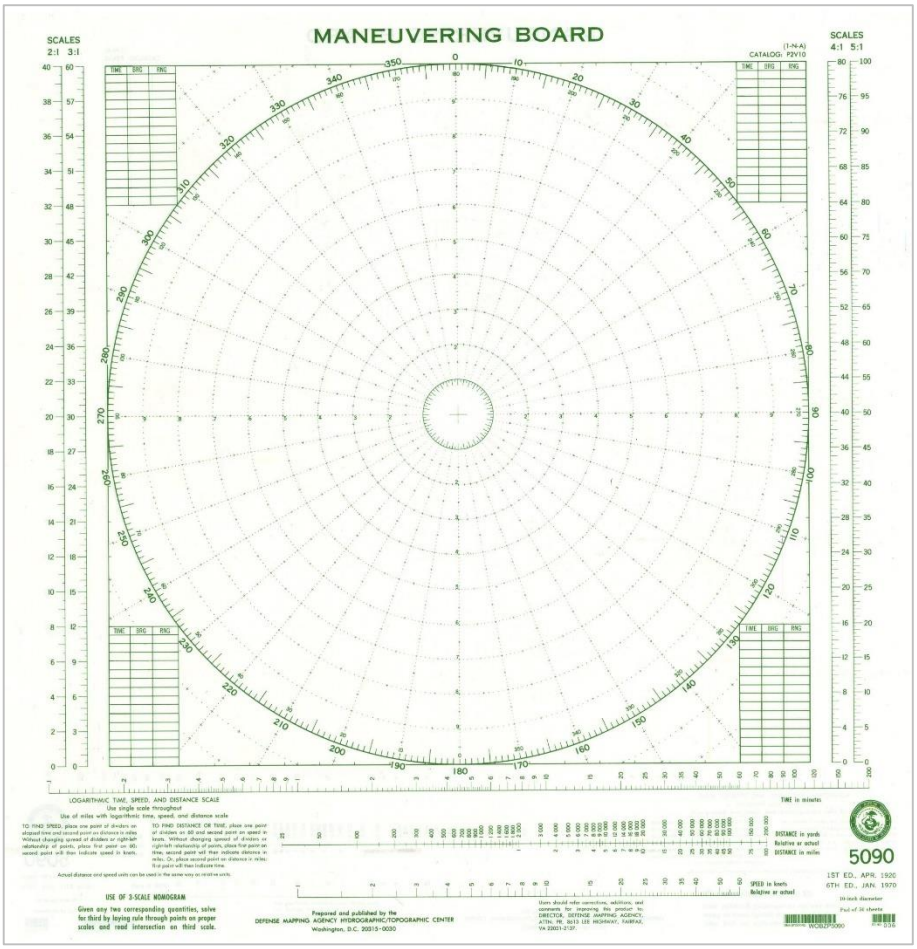
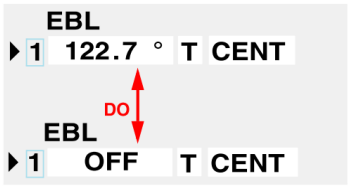
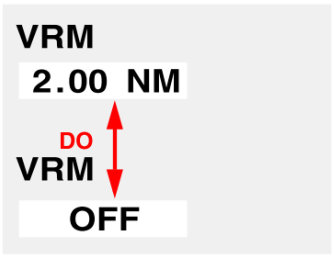
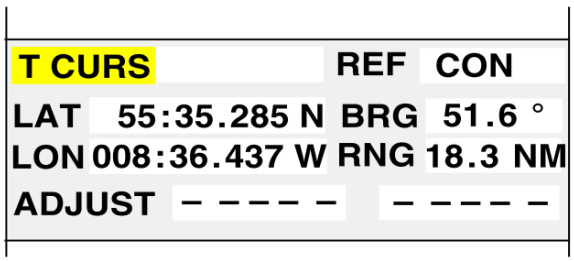


Figure 7.3.6.1. An example of a maneuvering board [7.3]

EBL AND VRM

No.	Measurement	Description
1	Electronic Bearing Lines (EBL)	 The radar has two EBL's, which can be adjusted independently of one another. With these EBL's, the bearing of an object with respect to own ship or the bearing between two objects can be determined.
2	Variable Range Markers (VRM)	 The radar has two VRM, which can be adjusted independently of one another. With these markers, the distance from own ship or (in conjunction with the EBL) the distance between two objects can be measured.
3	Cursor Display	 The bearing and range of an object with respect to own ship can most easily and quickly be read off on the cursor display. As soon as the cursor is situated in the PPI, the cursor position instead of the own ship position is shown in the position display. T CURS (instead of POS) then appears in the position display. Behind BRG, the true bearing of the cursor position with respect to own ship is displayed, and behind RNG, the distance from own ship's position to the cursor position is displayed.

7.3.7 COLREG

Выбор маневра по расхождению на основе радиолокационной информации в соответствии с обстоятельствами и МППСС

Rule	**Description**
Rule 5 Look-out	In Rule 5, the phrase 'All available means' includes radar and other available equipment (e.g. radar transponders, AIS, VHF radio, etc. if fitted), as well as visual and aural means.
Rule 6 Safe speed	For vessels with operational radar, Rule 6(b) lists additional (radar) factors which must be taken into account.
Rule 7 Risk of collision	Rule 7(b) warns that proper use shall be made of radar equipment (if fitted), including long-range scanning and systematic observation/ plotting of contacts. Rule 7(c) warns against making decisions on scanty information, especially scanty radar information.
Rule 8 Action to avoid collision	Rule 8(b) warns that any manoeuvre should be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations should be avoided.
Rule 19 Conduct of vessels in restricted visibility	Rule 19(d) directs that when another vessel is detected by radar alone, an assessment is to be made of whether a close-quarters situation is developing and/or risk of collision exists. Guidance on appropriate manoeuvring action then follows: Avoid an alteration of course to port for a vessel forward of the beam, other than for a vessel being overtaken, or towards a vessel abeam or abaft the beam.

7.3.8 ADJUSTING RADAR

Порядок управления и настройки РЛС при плавании вблизи берега, в открытом море, в условиях ограниченной видимости и ночью

ORIENTATION VALUES FOR SETTINGS ON THE OPEN SEA

Weather condition	Gain	Anticlutter sea	Anticlutter rain	Clean Sweep	Interference rejection	Pulse length
Up to sea state 3 – 4, no rain	90% – 100%	20%	30%	MEDIUM or HIGH	On	SP
Up to sea state 3 – 4, rain medium to heavy	85% – 95%	20%	50% – 60%	MEDIUM or HIGH	On	SP or LP
Up to sea state 6 – 9, with rain	80% – 90%	30% – 50%	40% – 50%	MEDIUM or HIGH	On	LP

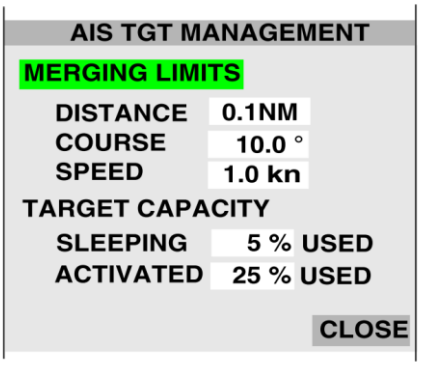
7.4 ARPA

Использование САРП для обеспечения безопасности мореплавания

7.4.1 OPERATING AND SETTING

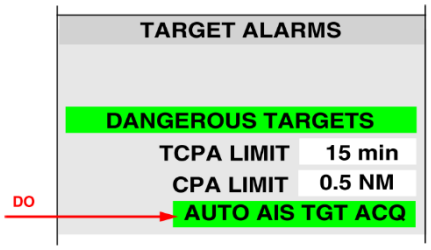
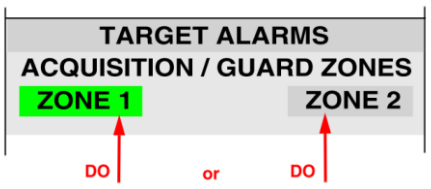
Включение, настройка, выставление параметров, проверка работоспособности, выключение. Определение места, использование параллельных индексов, линий фарватера и элементов карты. Использование стабилизации относительно воды и грунта, ограничения и возможные ошибки.

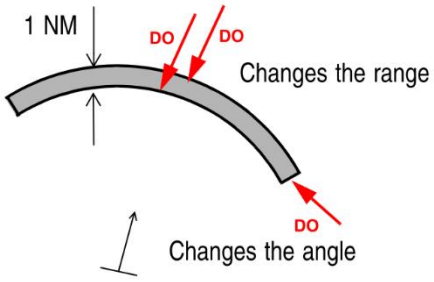
Operating/ Setting	Description
Acquiring a Target Manually	Using the keyboard Move the cursor to the target video or the sleeping AIS target and press the ACQ TGT key. Using the MORE context menu Click on the target video with the MORE key, and then click on ACQUIRE TARGET (ARPA) (with the DO key). If a target video is acquired, the ARPA electronics performs the following routine: First of all, the target video is marked with a broken circle . During the next three revolutions of the antenna, a check is performed to determine whether the echo occurs twice at this position. If it does, the echo is recognised as an ARPA target, and is acquired. If it does not, the ARPA electronics does not recognise any target at this position, the LOST TARGET (n) alarm occurs, and the supposed non-acquired target is now marked with the flashing symbol. If, with procedure 2, a sleeping target has been acquired, acquisition takes place without any further check.
AIS/ARPA Target Merging	An ARPA target and an AIS symbol may represent the same object. In order to determine if this is the fact, ARPA and AIS data for distance, speed and course are compared. If the difference in data are within preset limits, the targets will be merged if the merging function is activated. In this case, only one of the symbols

	is shown. Anyway, both targets will be tracked. The blanked-out symbol will appear again automatically if the differences in data exceed the pre-set limits. The limits required for this are set in the AIS TGT MANAGEMENT Dialog: Click on the MENU button, and then click on AIS..., then on the AIS TGT MANAGEMENT button. There, the currently valid values are shown under MERGING LIMITS and can be changed after clicking. To activate the Target Merging function press on the MERGING LIMITS button.  DISTANCE: Distance between ARPA target and AIS target COURSE: The course difference between the two targets. Evaluated by comparison of data delivered by ARPA and those delivered by AIS. SPEED: The speed difference between the two targets As long as all three values lie below the defined limits, the display of the ARPA or AIS target is omitted. SLEEPING ... USED: The percentage of the maximum number of tracked sleeping AIS targets. Up to 400 sleeping targets can be tracked. ACTIVATED ... USED: The percentage of the maximum number of tracked activated AIS targets. Up to 40 activated targets can be tracked.
Deletion of Targets, Loss of Target	An ARPA target is tracked automatically until - it is deleted manually or - it leaves the target tracking range of 20 NM or - it is lost within the target tracking range of 20 NM. An ARPA target is lost if, during five revolutions of the antenna, no correlation of the video can be found by the radar, or the detection probability falls below 50%. If an ARPA target is lost within a distance of 19.5 NM, a LOST TARGET (n) alarm appears and the symbol of the lost target changes its shape and flashes until the alarm is acknowledged. Deletion of a Target Click on the target with the MORE key, and then click on DELETE TARGET (with the DO key).

7.4.2 AUTOMATIC TARGET ACQUISITION

Критерий автозахвата

Operating/ Setting	**Description**
Automatic Acquisition of AIS Targets by Collision Avoidance Computation	Sleeping AIS targets becoming dangerous can be acquired automatically. ARPA targets and sleeping AIS targets can also be acquired automatically by means of an acquisition or guard zone.  If the TCPA and CPA values of a sleeping target fall below the values that were set, that target is automatically acquired. In this case: - the DANGEROUS TARGET alarm appears - the target which has caused the alarm is indicated on the PPI by means of the flashing symbol - the TARGET DATA display is automatically switched on with this target at the first place, the ID field is red, and the symbol on the PPI is marked with the target ID.
Automatic Acquisition by Means of Acquisition/Guard Zone	Switching the Acquisition/Guard Zone On and Off The acquisition/guard zone is switched on and off by clicking on the button ZONE 1 or ZONE 2. If the acquisition/guard zone is switched off, automatic target acquisition does not take place. Targets already acquired continue to be tracked.  Setting the Range of the Acquisition/Guard Zone Click on the inner or outer limit of the acquisition/guard zone, drag the zone to the desired size, and press the DO key. The outer limit can be set to a value between 1.5 NM and 20 NM.

	 Setting the Angle of the Acquisition/Guard Zone Click near a side limit into the acquisition/guard zone, drag the zone to the desired angle, and press the DO key. The angle can be set to a value between 5° and 360° . The setting takes place relative to the heading direction, i.e. the acquisition/guard zone turns with the ship's heading.

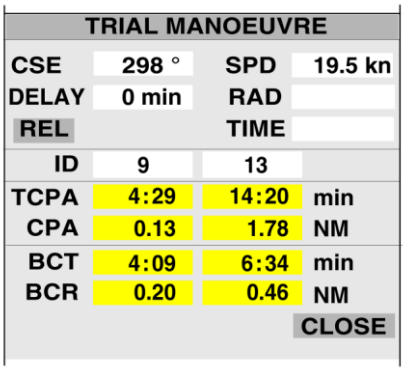
7.4.3 CALCULATION PRINCIPLES FOR RELATIVE/ TRUE TARGET DATA

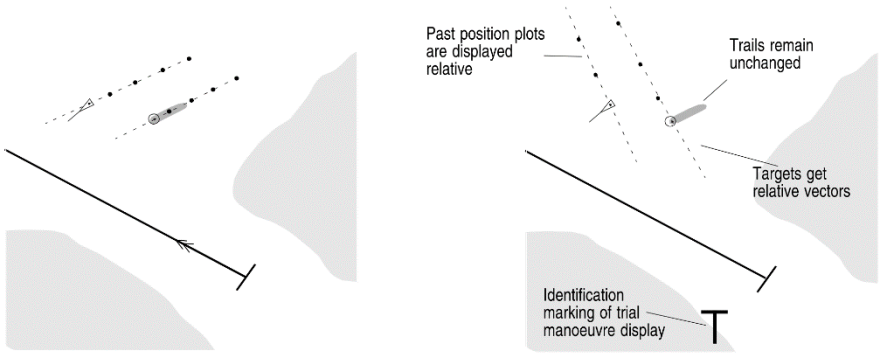
Получение и оценка информации о цели в истинном и относительном движении с индикацией истинных и относительных векторов. Графическое представление информации о целях и опасных зонах.

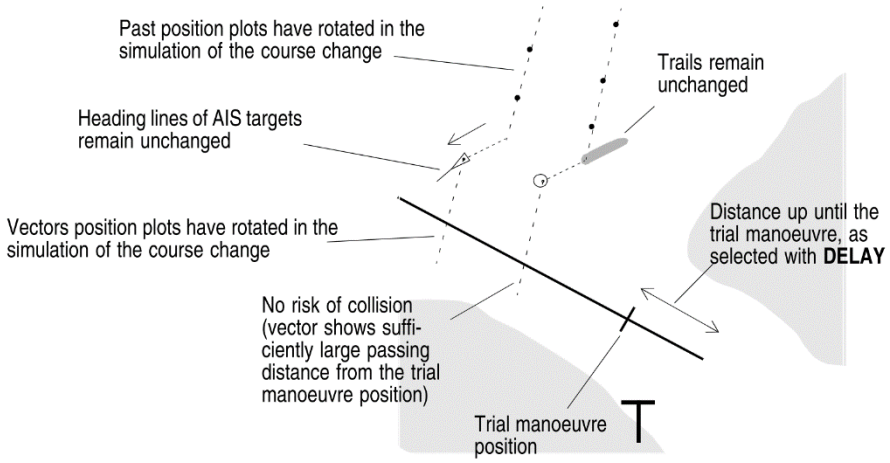
Calculation principles	**Description**
Relative target data	The relative data are calculated directly by the ARPA. The ARPA uses the plots of consecutive antenna scans in order to calculate relative course and speed of the target. Out of this, CPA and TCPA can be calculated. CAUTION: If there is any doubt that the own ship's speed data are not correct, use the REL target data and PPI presentation for collision avoidance purposes.
True target data	In order to calculate true data of a target, the own ship's course and speed must be known. The accuracy of the true data calculation depends on the accuracy of the sensors from which the own ship's course and speed are provided.

7.4.4 TRIAL MANOEUVRES

Выбор действий по расхождению с целями, проигрывания маневра

Operating/ Setting	**Description**
General	Trial manoeuvres are needed mainly for collision avoidance. In this process, a planned manoeuvre of own ship is simulated and the effect of this manoeuvre on the targets being tracked or plotted is checked in a graphic display. The trial manoeuvre can be specified by - simulation of a course change, including the radius to be used by the ship - the period of time up until the beginning of the simulated manoeuvre (the delay) - simulation of a speed change at the instant of the manoeuvre. There are two display modes available: - At the instant when the trial manoeuvre function is switched on, a switch-over to Relative Display mode takes place. This display mode is used for fast setting of the necessary course-change, of the delay and of the speed change. - In True Display mode, the manoeuvre radius that can then be set and the acceleration for the set speed-changes are taken into account additionally. The target tracking/plotting and the automatic target acquisition are not interrupted during the execution of a trial manoeuvre. It is recommended to use the trial manoeuvre function in relative mode in order to evaluate the change of relative target data. If the true mode is used, it is recommended to select a speed sensor with water stabilisation (water track).
Switching On the TRIAL MANOEUVRE Dialog	Click on the buttons MENU, UTILITIES and TRIAL MANOEUVRE one after the other. This causes switching into the Relative Display of the radar synthetics. The general screen-stabilisation (TM or RM) and the alignment of the heading line remain unchanged.  In the Multidisplay, the TRIAL MANOEUVRE Dialog appears, with the following data: - CSE: The currently existing course - SPD: The currently existing speed - DELAY: 0 minutes - ID, TCPA, CPA, BCT, BCR: Current data of the two targets selected last.

	The following changes occur in the PPI: - In the lower region of the PPI, a large, flashing is shown to draw attention to the fact that the trial manoeuvre display is switched on and that, consequently, the symbols and vectors of the targets being tracked are no longer being displayed in accordance with the real situation that actually exists at that time. - The vector display (of the targets) is switched on. - The vectors are displayed relative. - Past position plots, if any exist, are displayed relative. Because the currently existing values were taken over, no manoeuvre has been simulated yet.  Display before switch-on of the trial manoeuvre (with true vector display) Display after switch-on of the trial manoeuvre (the target on the right is on a collision course)
Setting the Trial Manoeuvre in Relative Display Mode	Because the vector display during the trial manoeuvre is a relative display, a collision course can be recognised from the fact that the vector of a target is pointing towards the own ship symbol (constant bearing). A manoeuvre must be simulated which avoids this constant bearing while at the same time fulfilling other conditions (e.g. keeping within the channel, avoiding shallow water, etc.). Simulating a Course Manoeuvre Click on the CSE field, set the trackball to the desired course change, and press the DO key for the second time. Setting the Time Instant of the Simulated Manoeuvre Click on the DELAY field, use the trackball to set the time that is to pass before the simulated manoeuvre begins, and press the DO key for the second time. Simulation of a Speed Change Click on the SPD field, use the trackball to set the speed at which the ship is to travel from the beginning of the simulated manoeuvre onwards, and press the DO key for the second time.

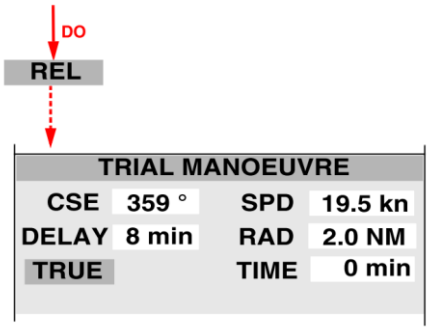


Relative display after setting of a trial manoeuvre which would prevent a collision

Checking the Trial Manoeuvre in True Display Mode

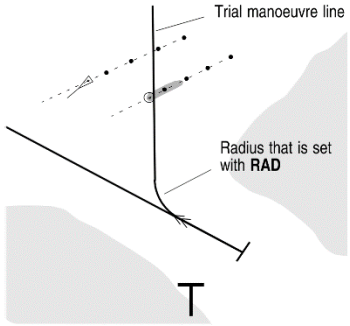
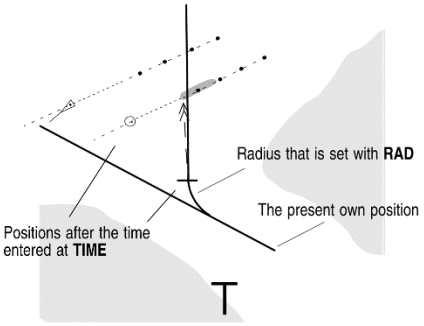
In True Display mode, the trial manoeuvre is displayed with true vectors. Both the radius planned for the manoeuvre and the acceleration behaviour for the speed change that is set are taken into account. All settings made in Relative Display mode can still be changed in True Display mode.

Switch-On of the True Display Mode
The switch-over between true and Relative Display mode is performed in the TRIAL MANOEUVRE Dialog by clicking on the REL or TRUE button.



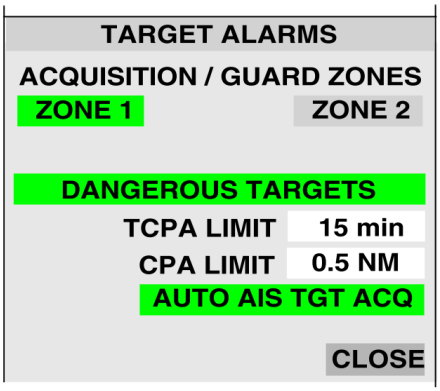
Changing the Simulated Manoeuvre-Radius
Click on the RAD field, use the trackball to set the radius with which the course change is to take place, and press the DO key for the second time.

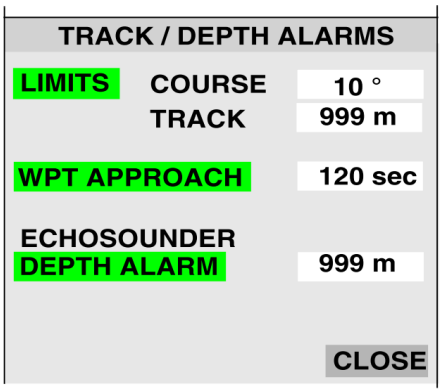
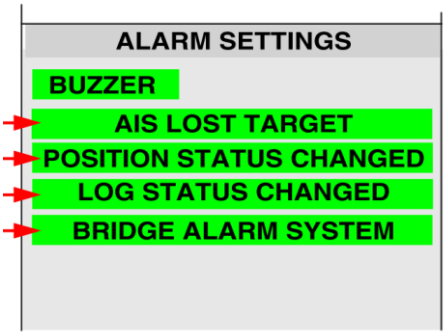
Checking the Trial Manoeuvre
By means of TIME, the instant of time that is to be considered can be set:
Click on the TIME field and, with the trackball, vary the time instant that is to be displayed. By continuous variation, a synchronised display of the simulated own ship positions and target positions takes place. If, for all TIME values, an adequate distance between own ship symbol and the target symbol is displayed, the trial manoeuvre will not show a dangerous approach.
End the check by pressing the DO key.

	 **Display after switch-over to True Display mode**  **Check by variation of the TIME input**
Switching Off the Trial Manoeuvre Display	Switching off is performed by pressing the CLOSE button of the TRIAL MANOEUVRE Dialog.

7.4.5 ALARM SETTINGS

Использование предупредительной сигнализации

Alarm settings	**Description**
Target Alarm Settings	The task of switching the acquisition/guard zone on and off is performed in the TARGET ALARMS Dialog: Click on the MENU button, and in the ALARMS menu click on the TARGET ALARMS button. The TARGET ALARMS Dialog then appears on the Multidisplay.  Switching the Computation for Collision Avoidance On and Off The computation for collision avoidance is switched on and off with the DANGEROUS TARGETS button. Changing the TCPA / CPA Limits Click on the TCPA LIMIT or on the CPA LIMIT field, and then enter the value with the virtual keyboard.
Track / Depth Alarms	When a System Track is defined, every radar indicator and every CHARTPILOT checks continuously whether the course defined by the System Track is being maintained, whether the ship's System Position is situated on the System Track, and how much time remains until arrival at the wheel-over point of the TO-waypoint. If one of the limits entered for this purpose is exceeded, an alarm is given if the relevant alarm function is in the switched-on state. The settings for this are made in the TRACK / DEPTH ALARMS Dialog: Click on the MENU button, and in the ALARMS menu click on the TRACK/DEPTH ALARMS button. The TRACK / DEPTH ALARMS Dialog then appears on the Multidisplay.

	 Depth Alarm If the water depth measured under the transducer by the connected navigation echosounder is less than the limit that is entered for this, the depth alarm DEPTH LIMIT EXCEEDED is given.
Suppressing Certain Alarms	Sea areas exist where some of the available alarms are activated repeatedly and could disturb the navigational tasks of the operator, therefore the output of the alarms can be switched on and off by the operator: In the ALARM menu, click on SETTINGS and then with DO on the corresponding button. LOST TARGET(n) for AIS targets, POSITION STATUS CHANGED, LOG STATUS CHANGED and BRIDGE ALARM SYSTEM 

7.4.6 ARPA MALFUNCTIONS

Ограничения, опасность чрезмерного доверия, задержка информации, точность получаемой информации

Possible fault/ Alarm messages	**Description**
Possible system faults	Azimuth fault (error 4010) Video interrupt timeout (error 4011)
GYRO FAULT	The compass system is switched off, or has failed, or is reporting incorrect data. The gyro interface connected to the radar system has failed. Acknowledgement is possible on any indicator. Remedy: Check the compass system, the signal transmission and the gyro interface.
MAGNETRON FAULT	The selected transceiver is reporting magnetron overcurrent. Remedy: Switch the transceiver over to stand-by, and then switch it back to radar operation. If the warning occurs repeatedly, request service.
NO HEADMARKER	The antenna's headmarker signal is missing. Remedy: - If the antenna is not rotating, check the ship's mains and/or the antenna fuse or circuit-breaker. - If the antenna is rotating, request service.
NO TRIGGER	The radar transmission trigger is missing. If this indication appears at all radar indicators of the system, it indicates a basic failure of the Interswitch. Remedy: - Check the radar transceiver. - In the case of the Interswitch failure.
NO ANTENNA AZIMUTH	The azimuth angle information of the antenna is missing. Remedy: - If the antenna is not rotating, check the ship's mains and/or the antenna fuse or circuit-breaker. - If the antenna is rotating, request service.
NO RADAR VIDEO	The system is in a faulty condition, such that the radar video cannot be generated. Remedy: - Check the radar transceiver - Check the antenna - Request service.
TRANSCEIVER OFFLINE	The radar indicator electronics has no contact with the selected transceiver. The selected transceiver is reporting a malfunction.

7.5 AIS

AIS

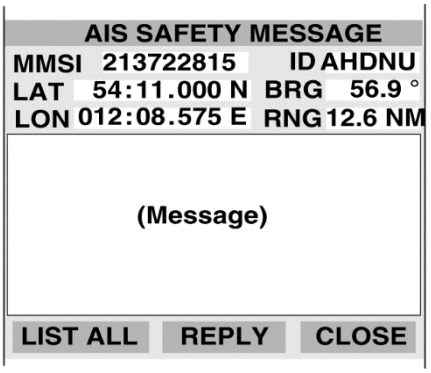
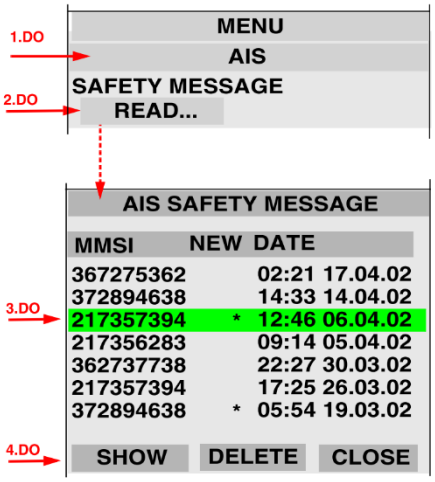
TECHNICAL DATA

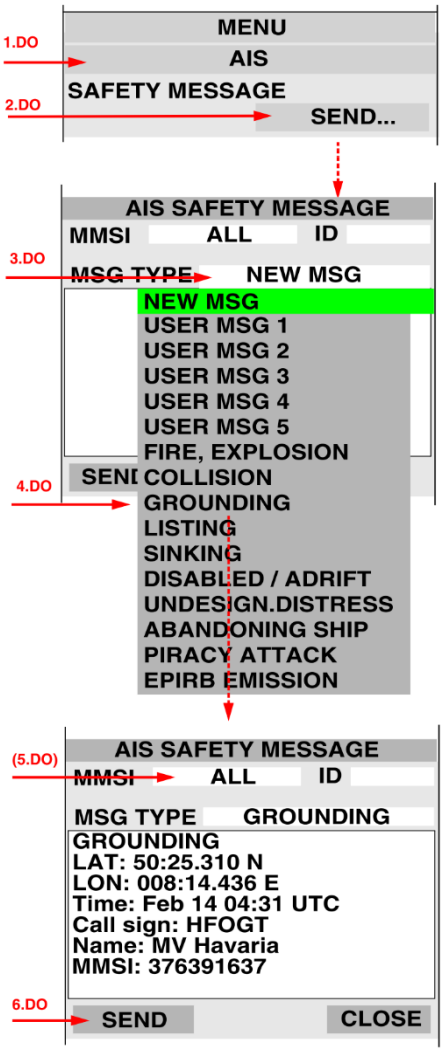
Manufacturer *Производитель*	SAM Electronics GmbH
AIS system *Аппаратура АИС*	Universal Shipborne Automatic Identification System (AIS)
Model *Модель*	UAIS DEBEG 3400 / AIS 3410
AIS channels	AIS Channel A uses the VHF Channel 2087 AIS Channel B uses the VHF Channel 2088 Bandwidth setting – Auto Transmission power level – High

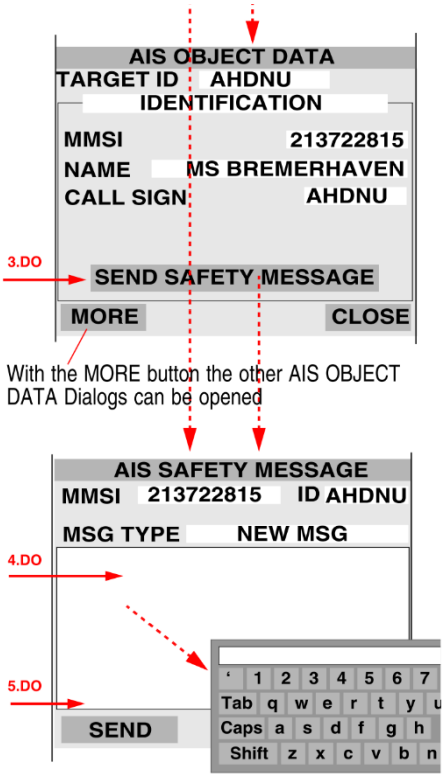
GENERAL INFORMATION

AIS Summarised Briefly	In addition to the ARPA electronics, the Universal Shipborne Automatic Identification System (AIS) automatically provides the ship's nautical officers with important information about nearby vessels or other relevant objects within VHF range. The AIS system transmits own ship data cyclically via two defined VHF channels and receives the same data of the other ships and objects that are equipped with AIS systems.
Targets and Other AIS Objects	With regard to the objects that can be detected by the AIS system and transferred to the radar indicator, a distinction is drawn between the following: - AIS targets: ships that are equipped with an AIS system - SAR aircraft: search-and-rescue aeroplanes or helicopters - Aids-to-Navigation: navigation marks, e.g. beacons and buoys - Base stations: Equipment for controlling the AIS system, e.g. as a component of a traffic control centres. All AIS objects can be displayed on the PPI, and in ECDIS mode they can be displayed throughout the entire chart area (with the exception of acquired/tracked AIS targets and SAR aircraft). The data of the individual displayed objects can be displayed.

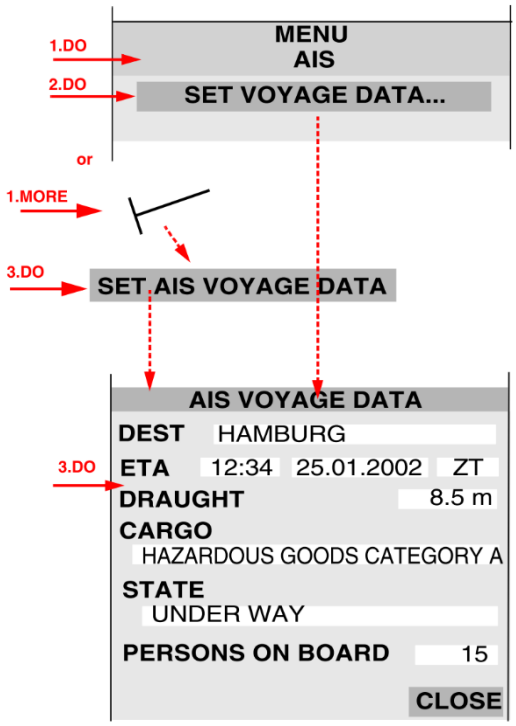
AIS MESSAGES

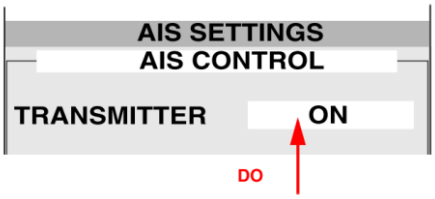
Operating	Description
New Safety Message	When the AIS electronics unit receives a safety message, the AIS NEW SAFETY MESSAGE alarm appears. By acknowledgement of the alarm, the AIS SAFETY MESSAGE Dialog appears in the Multidisplay.  The identification data and position of the transmitting AIS object are shown above the message. The received message is enclosed in a frame. With LIST ALL, the AIS SAFETY MESSAGE list containing the stored safety messages is opened. With REPLY, the Dialog with which a message can be sent back is opened. The MMSI of the AIS system from which the message was received is already entered in the Dialog.
Displaying Stored Safety Messages	As long as a received safety message has not been deleted, it can be called up again for display:  1. Click on the buttons MENU, AIS and SAFETY MESSAGE, READ..., one after the other. In the AIS SAFETY MESSAGE list which then opens up, all safety messages that have not yet been deleted are listed: MMSI: AIS system number of the transmitting AIS object

	NEW: Messages that have not yet been read are provided with an asterisk *. DATE: The time and date of reception 2. Mark the desired message by clicking. 3. With SHOW, the message is displayed.
Deleting Received Safety Messages	Forty safety messages can be stored in the system. When this number is reached and a further message is then received, the oldest stored message is deleted and the AIS SAFETY MESSAGE LOST alarm appears. So that a message that is worth keeping is not deleted in this way, and in order to avoid these alarms, it is a good idea to delete messages that are not important. This is done either with the DELETE button (situated in the AIS SAFETY MESSAGE Dialog) for the message that is being displayed, or with the DELETE button (situated in the AIS SAFETY MESSAGE list) for the message that is marked there.
Broadcasting a Distress Message Generally	 1. Click on the buttons MENU, AIS and SAFETY MESSAGE, SEND..., one after the other. 2. If a distress message is to be transmitted: In the Multidisplay, click on the MSG TYPE field, and then click on the required message. The message is generated and displayed automatically. It contains the currently valid data of own ship. If a freely composed, individual text is to be transmitted.

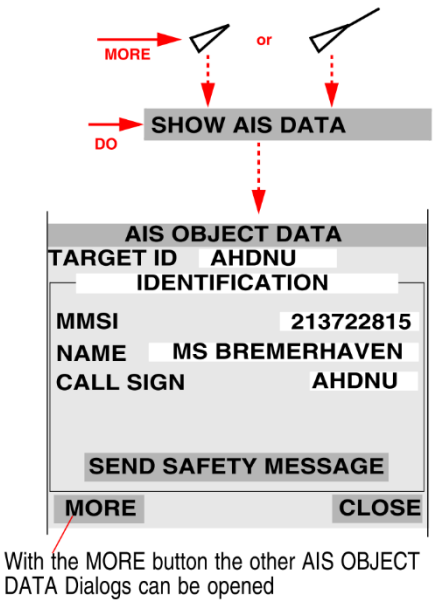
	3. When the message is to be broadcast generally, ALL must have been entered as the MMSI. If ALL is not already entered there, this is achieved by clicking on the MMSI field (clicking for a second time causes a return to the previous entry). 4. After clicking on the SEND button, the message is transmitted. With CLOSE, the Dialog is closed without transmission of the message.
Transmitting a Message to a Particular AIS Target or Base Station	 1. Click on the desired AIS object with MORE and select SEND SAFETY MESSAGE. 2. If a freely composed, individual text is to be transmitted, the following possibilities exist: a) Do not click on the MSG TYPE field (MSG TYPE is NEW MSG), click into the empty message field and edit the new message with the virtual keyboard. b) Click on the MSG TYPE field, and by selecting NEW MSG or USER MSG 1 ... 5 call up the message that was stored last under the selected designation. The message is stored during transmission, and so also are the messages USER MSG 1 ... 5 if the Dialog is closed with CLOSE (without transmission). If a distress message is to be transmitted: Click on the MSG TYPE field and click on the required message. 3. After clicking on the SEND button, the message is transmitted. With CLOSE, the Dialog is closed without transmission of the message.

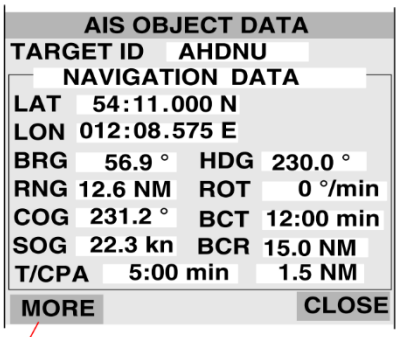
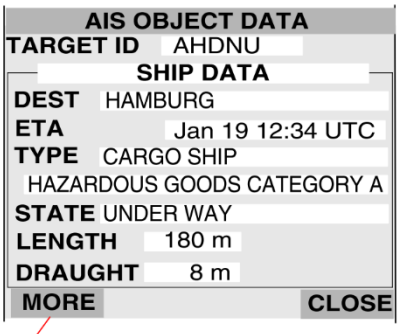
AIS SETTINGS

Operating/ Setting	Description
Setting the Own AIS Data	Most of the data that are sent by own AIS system for the purpose of target data display on other ships (own AIS data) are generated automatically by the system (e.g. identification data, position, etc.). However, some items of information (e.g. ship's draught, cargo, destination, ETA) have to be defined by the operator. IMPORTANT: The following data must be entered at the beginning of every voyage, and must (if necessary) be updated during the voyage to ensure correct and up-to-date information to be sent to other ships.  Specifying the Data that are to be Transmitted Depending on the Voyage 1. Click on the buttons MENU, AIS and SET VOYAGE DATA, one after the other. 2. In the AIS VOYAGE DATA Dialog which then opens up in the Multidisplay, enter the data or correct them: DEST: Destination of this voyage ETA: Estimated time of arrival at the specified destination DRAUGHT: The existing draught CARGO: Prescribed information about the cargo TYPE: Prescribed information about the sub-type of ship STATE: Navigational state PERSONS ON BOARD: The number of persons on board.
Switching Off the Transmitter	If necessary, the transmitting of own AIS data can be completely prevented: This setting takes place in the AIS SETTINGS Dialog AIS CONTROL:

	Click on the MENU button, and then, in the AIS menu, click the AIS SETTINGS button. In the Multidisplay, the AIS SETTINGS Dialog AIS CONTROL appears. By clicking on the TRANSMITTER area, the transmitter part of the AIS electronics units switched on and off.  CAUTION: The transmitter should not be switched off except in justified exceptional cases, because when it is switched off, own ship can no longer be detected as a target by other ships and cannot participate in the communication between ships, equipped with AIS. The status TRANSMITTER ON/OFF is stored with date and time and can also be called up after an accident at sea.

AIS TARGET DATA

Data	**Description**
IDENTIFICATION	With the MORE key, click the desired (tracked) AIS target and select SHOW AIS DATA. In the Multidisplay, the AIS OBJECT DATA, Dialog IDENTIFICATION then appears, with the data of the clicked target:  TARGET ID: The target ID used on the PPI; the target is a ship or SAR ID: The target ID used on the PPI, the target is a SAR aircraft.

	MMSI: Maritime Mobile Service Identity, definite identification of the AIS system (and hence of the target) NAME: Name of the target CALL SIGN: The call sign of the target
NAVIGATION DATA	The following data have been determined dynamically aboard the target ship: LAT, LON Position of the target COG Course over ground of the target SOG Speed over ground of the target HDG Heading of the target ROT Rate of turn of the target The following data have been computed by own radar: BRG Bearing of the target RNG Range of the target BCT Time that will pass before the target crosses the heading line of own ship BCR Range of the point on own ship's heading line at which the target will cross that line. Negative value: Target crosses the stern line behind own ship. T/CPA Time up until the closest point of approach and distance at the closest point of approach These data are also displayed for an SAR aircraft, with the exception of HDG and ROT. Additional display: ALT Flight altitude of the SAR aircraft.  With the MORE button the other AIS OBJECT DATA Dialogs can be opened
SHIP DATA	Here, the static target-data, some of which were entered by the crew of the target, are displayed.  With the MORE button the other AIS OBJECT DATA Dialogs can be opened

7.6 NAVTEX

Приёмник NAVTEX

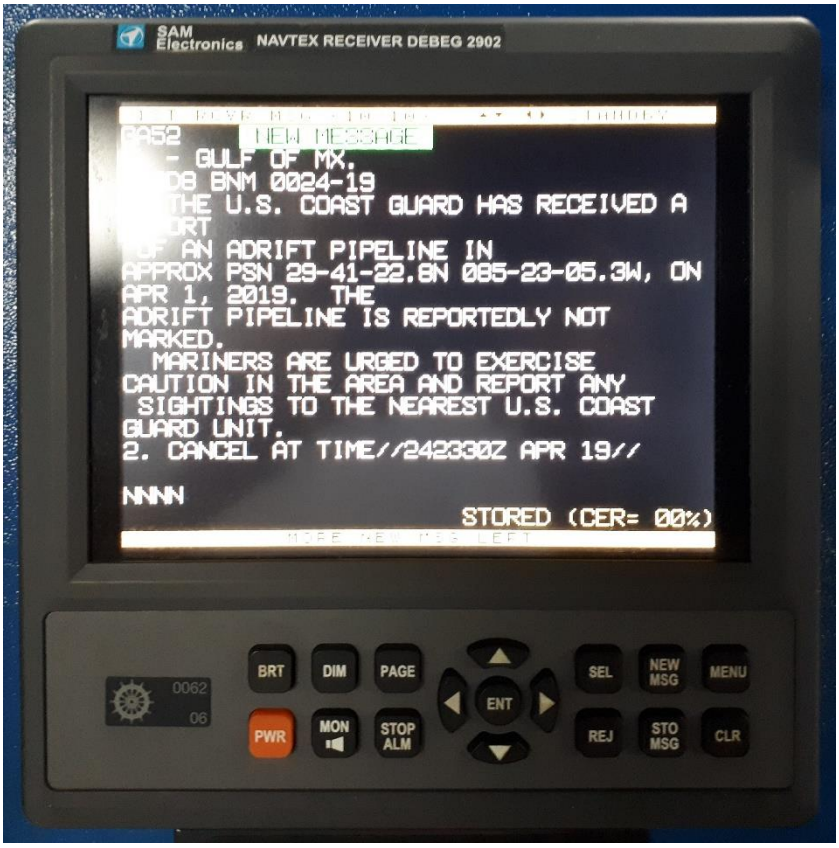


Figure 7.6.1. NAVTEX Receiver [7.6]

7.6.1 TECHNICAL DATA

Приёмник NAVTEX

Manufacturer *Производитель*	SAM Electronics GmbH
NAVTEX Receiver *Приемник NAVTEX*	Dual Channel NAVTEX Receiver
Model *Модель*	DEBEG 2902

Operating Frequencies	First Receiver – 518 kHz (English) Second Receiver – 490 kHz (National languages), 4209.5 kHz (Local users) Stations on each frequency transmit NAVTEX messages usually for a period of 10 minutes on a time-sharing basis to avoid cross-station interference.
Message Storage	Capacity 200 messages (average 500 characters per message) for each of 518 kHz, 490 kHz and 4209.5 kHz receivers. Duration 60 hours from successful reception of each message, after which old messages will be automatically erased from memory on a first-in-first-out basis except for user-protected messages that cannot be erased from memory until their protection tags are removed manually. Storage without Power Protected messages are stored for at least 10 days after power is removed continuously.

7.6.2 NAVTEX MESSAGE ABBREVIATIONS

Сокращения, выводимые на ленту приёмника NAVTEX

COMMON ABBREVIATIONS FOR THE INTERNATIONAL NAVTEX SERVICE

Abbreviation	Terminology	Abbreviation	Terminology
N	North / Northerly	MOV / MVG	Moving / Move
NE	Northeast / Northeasterly	VEER	Veering
E	East / Easterly	BACK	Backing
SE	Southeast / Southeasterly	SLWY	Slowly
S	South / Southerly	QCKY	Quickly
SW	Southwest / Southwesterly	RPDY	Rapidly
W	West / Westerly	KT	Knots
NW	Northwest / Northwesterly	KMH	km/h
DECR	Decreasing	NM	Nautical miles
INCR	Increasing	M	Metres
VRB	Variable	HPA	Hectopascal
BECMG	Becoming	MET	Meteo...
LOC	Locally	FCST	Forecast
MOD	Moderate	TEND	Further outlooks
OCNL	Occasionally	VIS	Visibility
SCT	Scattered	SLGT / SLT	Slight
TEMPO	Temporarily / Temporary	QUAD	Quadrant
ISOL	Isolated	POSS	Possible
FRQ	Frequent / Frequency	PROB	Probability
SHWRS / SH	Showers	SIG	Significant
C-FRONT / CFNT	Cold Front	NC	No change
W-FRONT / WFNT	Warm Front	NOSIG	No significant change
O-FRONT / OFNT	Occlusion Front	FLW	Following

WKN	Weakening	NXT	Next
BLDN	Building	HVY	Heavy
FLN	Filling	SEV / SVR	Severe
DPN	Deepening	STRG	Strong
INTSF	Intensifying / Intensify	FM	From
IMPR	Improving / Improve	EXP	Expected
STNR	Stationary	LAT	Latitude
QSTNR	Quasi-Stationary	LONG	Longitude

7.6.3 EXAMPLES OF NAVTEX MESSAGES

Примеры распечаток и подробное описание выводимой информации

No.	Example of NAVTEX Message	Explanation
1	AA01 CCGDSEVEN BNM 092-19 STRAITS OF FL – ALLIGATOR REEF TO SOMBRERO KEY 1. TN REEF LT (LLNR 990) REP EXT. 2. CANCEL AT TIME //180400Z APR 19// NNNN	
2	GA52 FL – GULF OF MX. CCGD8 BNM 0024-19 1. THE U.S. COAST GUARD HAS RECEIVED A REPORT OF AN ADRIFT PIPELINE IN APPROX PSN 29-41-22.8N 085-23-05.3W, ON APR 1, 2019. THE ADRIFT PIPELINE IS REPORTEDLY NOT MARKED. MARINERS ARE URGED TO EXERCISE CAUTION IN THE AREA AND REPORT ANY SIGHTINGS TO THE NEAREST U.S. COAST GUARD UNIT. 2. CANCEL AT TIME//242330Z APR 19// NNNN	
3	GA58 DGPS BNM 064-19 TAMPA, FL 1. DGPS BROADCAST SITE IS UNUSABLE AS OF 081638Z APR 19 UNTIL FURTHER NOTICE. NNNN	

ABBREVIATIONS

A

AIS	Automatic Identification System	ARPA	Automatic Radar Plotting Aid

B

BA	Breathing apparatus		

C

CD	Charted depth	COLREG	The Convention on the International Regulations for Preventing Collision at Sea, 1972

D

d, T	Draft, draught (m)	DTG	Distance to go

E

ECDIS	Electronic Chart Display and Information System	ENC	Electronic Navigational Chart
EEBD	Emergency escape breathing device		

F

G

GHA	Greenwich Hour Angle	GPS	Global Positioning System
GMDSS	Global Maritime Distress and Safety System		

H

h	Height (m)	HW	High water

I

IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities	ISPS	International Ship and Port Facility Security Code
ICS	International Code of Signals		

J

K

L

LHA	Local Hour Angle	LW	Low water
LRIT	Long Range Identification and Tracking		

M

MF/HF	Medium Frequency/ High Frequency		

N

NACOS	Navigation and Command System	NBDP	Narrow-band direct printing
NAVTEX	Navigational Telex		

O

OOW	Officer of the watch		

P

PPE	Personal protective equipment		

Q

R

RNC	Raster Navigational Chart	RONS-89	Recommendations for Organization of Navigational Service 1989

S

SHA	Sidereal Hour Angle	SOM	Shipboard Operational Manual

T

T, t	Time, moment of time	TSS	Traffic separation scheme

U

V

VHF	Very High Frequency

W

WP, WPT	Waypoint

X

Y

Z

ZT	Local time

REFERENCES

1	**NAVIGATION AND SAILING DIRECTIONS** ***НАВИГАЦИЯ И ЛОЦИЯ***	
	1.1 Drawing 6050001D – Arrangement of Wheelhouse, Chart and Radio space	✓
	1.2 Ship document	
	1.3 Ship document	
	1.4 Bridge log book	
	1.5 Bridge log book	
	1.6 Bridge log book	
	1.7 ADMIRALTY paper and digital products Chartplanner3	
	1.8 Brown's Nautical Almanac	
	1.9 Symbols and Abbreviations Used on ADMIRALTY Charts (NP5011) ADMIRALTY Guide to ENC Symbols used in ECDIS (NP5012) R1001 – The IALA Maritime Buoyage System	
	1.10 CHARTPILOT 1100 – Operating Instructions	✓
	1.11 IMO Resolution A.893(21) – Guidelines for voyage planning	✓
	1.12 IMO Resolution A.893(21) – Guidelines for voyage planning	✓
	1.13 ADMIRALTY Manual of Navigation	✓
	1.14 Ship document	
	1.15 Ship document	
	1.16 N/A	
	1.17 GPS/ DGPS Manual	
	1.18 Radar Manual	
	1.19 Russian lectures	
	1.20 Ship document	

	1.21 SOM	✓
	1.22 N/A	
2	**NAUTICAL ASTRONOMY** ***МОРЕХОДНАЯ АСТРОНОМИЯ***	
	2.1. N/A	
	2.2. Ship document	
	2.3. Drawing 1000409I – Visibility plan	✓
	2.4. Future Seafarer	
	2.5. Star Finder and Identifier (NP 323)	✓
	2.6. Russian lectures	
	2.7. Russian lectures	
	2.8. Russian lectures	
	2.9. N/A	
3	**SHIP HANDLING AND MANOEUVRING** ***УПРАВЛЕНИЕ СУДНОМ***	
	3.1. N/A	
	3.2. Arubaborg TC Description Wheelhouse poster Pre-stowage plans	✓
	3.3. Emergency schedules A-series Drawing 4190001D – Safety and fire control plan	✓
	3.4. SOM Recommendations for Organization of Navigational Service (Russian RONS-89) ISPS Code SMCP	✓
	3.5. Safety sheet No. 8 – Mooring/ Unmooring operations Drawing 4020200D – Mooring and stern anchor arrangement plan Emergency towing booklet	✓
	3.6. Russian RONS-89 Russian lectures Drawing 4020100D – Anchoring arrangement plan	✓

	3.7. SOM Russian RONS-89 Russian lectures	✓
	3.8. Safety sheet No. 9 – Cargo operations SOM MacGREGOR Hatch covers – Instruction Manual LIEBHERR Cranes – Operating Manual Drawing 100406C – Capacity plan Drawing 4200805G – Draft mark plan	✓
	3.9. Safety folder Russian RONS-89 NORSAFE FFB – Instruction Manuals IAMSAR SOLAS	✓
	3.10. ISM Code SOM Guide to Port Entry SOLAS and Fi-Fi manuals	✓
	3.11. COLREG	
	3.12. ICS EPIRB KANNAD – Operating Instructions SART DEBEG – Inspection and Operation Booklet Handheld VHF radios ADMIRALTY List of Radio Signals – Volume 5 (NP 285) – GMDSS	✓
4	**METEOROLOGY** ***МЕТЕОРОЛОГИЯ***	
	4.1. N/A	
	4.2. NOAA's National Weather Service	
	4.3. ADMIRALTY List of Radio Signals – Volume 5 (NP 285) – GMDSS	
	4.4. Radio-Facsimile Receiver DEBEG 2952 – Operation and Installation Manual	✓
	4.5. The Mariner's Handbook (NP 100)	✓
5	**MARITIME ENGLISH** ***АНГЛИЙСКИЙ ЯЗЫК***	
	5.1. SMCP	✓
	5.2. SMCP	✓
	5.3. SMCP	✓

	5.4. SMCP	✓
	5.5. N/A	
	5.6. N/A	
6	**ELECTRO-NAVIGATIONAL EQUIPMENT** ***ЭЛЕКТРОНАВИГАЦИОННЫЕ ПРИБОРЫ***	
	6.1. Drawing 6050001D – Arrangement of Wheelhouse, Chart and Radio space	✓
	6.2. Magnetic Bearing Compass Binnacle – Operation – Installation Manual	✓
	6.3. Gyro Compass STD 22 – Operator Manual	✓
	6.4. Russian lectures	
	6.5. MULTIPILOT 1100 – Operating Instructions	✓
	6.6. EM-Log SAM 4642 – Technical Manual	✓
	6.7. Navigation Echosounder DEBEG 4630 – Operation and Installation Manual	✓
7	**RADIO-NAVIGATIONAL EQUIPMENT** ***РАДИОНАВИГАЦИОННЫЕ ПРИБОРЫ***	
	7.1. MULTIPILOT 1100 – Operating Instructions	✓
	7.2. ADMIRALTY Manual of Navigation GPS/ DGPS receiver	✓
	7.3. MULTIPILOT 1100 – Operating Instructions	✓
	7.4. MULTIPILOT 1100 – Operating Instructions	✓
	7.5. MULTIPILOT 1100 – Operating Instructions	✓
	7.6. Dual Channel NAVTEX Receiver DEBEG 2902 – Operation and Installation Manual	✓